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CHICAGO, MAY, 1915

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BELL-WESTERN ELECTRIC RELATIONS

IN accordance with the spirit of the Clayton law, which was passed last October, the interlocking relationship between the American Telephone and Telegraph Company, operator of public utilities, and the Western Electric Company, manufacturer of public utility supplies, has been dissolved. Although the provisions of the Clayton law do not go into effect for two years from the date of its passage, the Bell system has already met its requirements. Section 10 of the Clayton law provides:

That after two years from the approval of this act no common carrier engaged in commerce shall have any dealings in securities, supplies or other articles of commerce, or shall make or have any contracts for construction or maintenance of any kind, to the amount of more than $50,000, in the aggregate, in any one year, with another corporation, firm, partnership or association when the said common carrier shall have upon its boar of directors or as its president, manager, or as its purchasing or selling officer, or agent in the particular transaction, any person who is at the same time a director, manager, or purchasing, or selling officer of, or who has any substantial interest in such other corporation, firm, partnership or association, *unless and except* such purchases shall be made from, or such dealings shall be with, the bidder whose bid is the most favorable to such common carrier, to be ascertained by competitive bidding under regulations to be presented by rule or otherwise by the Interstate Commerce Commission. No bid shall be received unless the name and address of the bidder or the names and addresses of the officers, directors and general managers thereof, if the bidder be a corporation, or of the members, if it be a partnership or firm, be given with the bid.

It is our construction of this that the "common carrier engaged in commerce" has a choice. It may, if it likes, retain its interlocking directorates so long as it buys on the competitive market; or it may dissolve its interlocking directorates and buy under contract. At least that seems to be the view taken of the matter by the Bell interests themselves. They have made their choice; they elect to eliminate the interlocking feature and continue all other close relations with the Western Electric Company.

There has been considerable agitation, entirely outside the application of any recent anti-trust legislation, for the divorce of the Western Electric Company from the A. T. & T. Co. Independent committees have given considerable thought to the problem, actuated by the belief that such a severance would react to the benefit of the independent cause. We have naturally followed this line of reasoning closely; and we must confess our inability to see wherein any independent manufacturer or operator would be any better off for an open market of this kind.

It must be admitted that a number of independent operators now refuse to buy materials the profits on the sale of which go to enrich their business com-

petitor. That is not mere sentiment; it is sound logic. So it must also be admitted that, with the Bell control removed, not even the most enthusiastically independent of telephone men could give any ethical reason for refusing to buy from the factory that once was Bell but had become independent (small *i*). Briefly and frankly, a great many more independents would buy from the Western Electric Company than now do so. Any encouragement to independent manufacturers in that?

On the other hand, it is highly probable that the Bell operating companies would continue to buy from their former supplier, even without any contract or other agreement. Bell engineers are trained to Western Electric equipment; Bell plants are equipped with it, and their increases would logically use the same material. The whole course of tradition and routine, the channels of Bell thought, argue for a continuance of commercial relations. Suppose, the market being open (academically at least), the independent manufacturers could land a few Bell orders—as they doubtless could. Would those orders be sufficient to offset the fresh inroads of the Western Electric Company (independent) upon the independent operating field? We think not.

There is a great noise about peace and the cessation of hostilities between the Bell operating companies and the independent operating companies; but those who are close to the activities know that the Bell interests have never conducted a more consistent, persistent, subtle and intense campaign for the elimination of independent competition than is going on right now. The pleasant *billet-doux* exchanged by the Bell company and the United States Government, beginning December 19, 1913, seem to have had about the same weight and effect as Belgium's treaty with Germany.

And the independents know that. But with their already demonstrated tendency to be led from the subject into interesting by-paths, they find the *ignis fatuus* of Bell-Western Electric dissolution giving them an exhilarating chase afield. So far as it has gone, that dissolution has been planned for months. Why not set the independents to discussing it and passing resolutions upon it, thus distracting their attention from the Bell-independent merger work going on under their noses?

There are things more vital to the independents in the operating field today than the separation of Bell and Western Electric interests. That may be important; but we would advise against concentrating more than one eye upon it just now.

NATIONAL ASSOCIATION PRINCIPLES.

ALL independents are brothers, and while differences may exist in the political complexions of certain factions, like the Irish and the English, they unite against a common foe. Around the convention of the I. T. A. A. the question was often heard, "What does the old N. I. T. A. stand for, anyway?" But the query may be regarded as academic rather than malicious. Perhaps its justification has even been recognized, for the directors of the National Independent Telephone Association have just laid down a "Declaration of Principles" whose very existence seems to indicate that it was needed. This declaration we print on another page, and will not repeat here in full. We will, however, go so far as to point out, for the edification of those pessimists who do not believe the independents are improving, a certain radical change in the attitude of the N. I. T. A. directors toward the condition inspired by that notorious Bell letter of December 19, 1913.

On March 16, 1914, at a regular meeting of the Board of Directors of the National Independent Telephone Association, the original draft of the proposed Bell-Independent connection contract was passed upon. In the meeting of April 16, 1915, the latest form of proposal was considered. The contract form has improved slightly in the meantime; but the following parallel seems to show that the N. I. T. A. directors have improved still more:

MARCH 16, 1914.

Whereas, The directors of the National Independent Telephone Association have carefully read the proposed contract under which the Bell companies will furnish the Independent companies of the United States connection for toll services, and also the letter of Mr. Kingsbury to the attorney general of the United States, of the date of December 19, 1913, and find that in our best judgment the contract clearly and fairly in its details carries into effect the spirit of that letter and

Whereas, The agreement applies generally to competing companies, it being our understanding that all companies not competing with the Bell company may connect up for all toll business on the usual terms as to commissions, etc., and

Whereas, The acceptance or rejection of the agreement is left to each individual Independent company, and

Whereas, This association has no authority to enter into any contract that will bind its members, therefore be it

Resolved, That this association commend the agreement as being fair, leaving the question as to whether it should be entered into by Independents to each individual company to be determined solely by the advantage or disadvantage that such company will receive from the connection.

APRIL 16, 1915.

Whereas, The American Telephone and Telegraph Company has not carried out the spirit and intent of the stipulation with the Federal government under its letter of December 19, 1913, and

Whereas, The toll connection agreement now offered to Independent telephone companies is grossly unfair, now, therefore, be it

Resolved, That a committee be appointed to confer with the Department of Justice and the Interstate Commerce Commission with the view of securing a fair toll connection contract, and if suitable action cannot be obtained under present conditions, that this committee be instructed to work for the enactment of such physical connection laws as will secure interstate long distance connections for Independent telephone companies under the supervision of the Interstate Commerce Commission.

It may be noted, *en passant,* that a majority of the directors attending these two meetings were the same.

That is only one of several declarations that give the National Association a more decidedly independent tone than it has shown for some time. The proposed Bell contract, as now modified, offers more to the independents than did the first draft; but the committee appointed to confer on the matter now recommends its rejection. The modifications consist of a Bell offer to make the ten-cent differential reciprocal and payable to the terminating company in each case; to pay five cents to the originating independent company on each message; and to contract for long line business only. The committee recommends a demand

for equal routing privileges and a compensation fee of ten cents, instead of five, on originating messages whose charge exceeds fifty cents.

The association goes on record as favoring universal service—but without monopoly; and local ownership of telephone companies—which, of course, can only mean independent companies. These companies are to get their long distance service by legislative provision. Logical consideration of this claim seems to point, consciously or unconsciously, to government operation of long distance lines. That is too big a question to discuss here now.

The matter of uniting the two associations now working in the independent field is also given some attention in the declaration of principles, and at the meeting which passed the declaration the question was taken up with representatives of the Independent Telephone Association of America, but without definite results. Now that the old association has somewhat clarified its position and answered the question of "what it stands for," the problem may be a little nearer solution.

The last "principle" declared by the association favors laws prohibiting a public utility from manufacturing equipment *except for its own use*. That is a reasonable demand, and doubtless is the way the situation will ultimately work out. We are handling the subject of Bell-Western Electric relations in another column. Let us add here that in this specific example the Bell companies should either relinquish all control or resume the old system of consuming its entire output. And we are not at all sure that the independents would be better off with the former arrangement than with the latter.

BUY IT NOW!

PUBLIC-SPIRITED persons who realize that the present (and past) tendency to business depression is due purely to mental attitude have started a "Buy Now" movement to get some hoarded money into circulation. This is not the first time we have had occasion to preach the same doctrine; but it is a good time to reiterate and emphasize it. That the retiring president of the National Independent Telephone Association has already done so in his annual address makes the appeal stronger.

Telephone operating companies and other public utilities are in excellent position to give impetus to such a campaign. There are a number of things that a telephone company must buy sooner or later, if it is to continue to give service. To let these things wait upon a fairer day is to discard low prices in favor of high ones. Everyone knows the law of supply and demand; every telephone man knows he can get better prices when no one is buying than he can after they all enter the market again. It is not merely public spiritedness, it is the best of good business to buy what you can now. You will increase the prosperity of the country, banish the banshee of bad times, and save yourself some money if you will only stock up now with some of the material you are bound to need before the year is over.

At the annual meeting of the American Telephone & Telegraph Company, the board of directors was reduced from twenty-five members to seventeen.

CONVENTIONING IN CALIFORNIA.

THE Independent Telephone Association of America has decided to hold a special convention in San Francisco next October, and Secretary Vivian is already issuing his invitations.

It appears to us that the project requires little explaining and needs little boosting. Leaving out of the discussion any redundant reference to the justly celebrated advantages of the Golden State—advantages of climate and scenery about which every schoolboy has information—we would merely remind our readers that California is one of the best independent telephone centers in the Union.

If there is in the world a magazine, trade journal or newspaper that has not described the Panama-Pacific Exposition, now showing to capacity at the Golden Gate, that publication must be small indeed. Why dilate upon the subject? Like the before-mentioned climate, its repute is in the minds of all. That the big fair will be at the elbow of the convention will scarcely lessen the appeal of the trip.

San Francisco will be a popular convention city this year. It will see more easterners of the "hustling business man" type than it ever saw before. Probably ninety per cent of all the trades that practice the annual convention will endeavor to swing this year's meeting to the coast. It is a safe bet that practically everybody who has not seen California wants and hopes to see it, while those who have been there generally seem crazy to go again. All most of them want is a good excuse; and a trade convention is the best excuse in the world because it is perfectly legitimate and praiseworthy.

Indeed, it is necessary for the proper support of the Association that all its members who can possibly attend its 1915 convention do so. Aside from all the personal and selfish delights of a trip to California, the Association needs the attendance. Independent telephone men generally are finally awakening to the necessity of a strong organization, and the Association is making good progress. A successful and happy convention at this center of telephone activity—not to mention exposition center and climatic center—will cap the climax by soldering the loose ends together and leaving a pleasant reminiscence for a life-time.

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ED J. MOCK, *Business Manager*.

Sworn to and subscribed before me this first day of April, 1915.

(Seal) LEONA J. EKSTROM.

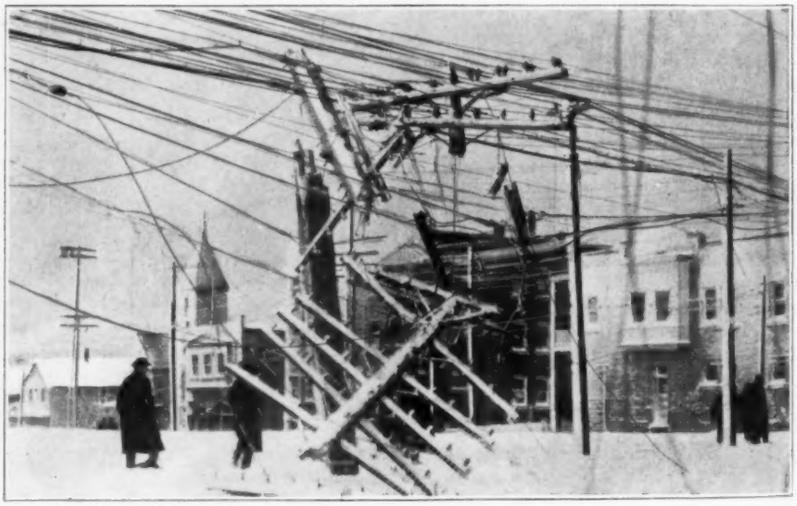
My commission expires Aug. 17, 1918.

Radio Outfit in a Motorcycle Side Car.

Repairing Job in the Kootenay Lake District, British Columbia, During High Water.—Telephone Talks.

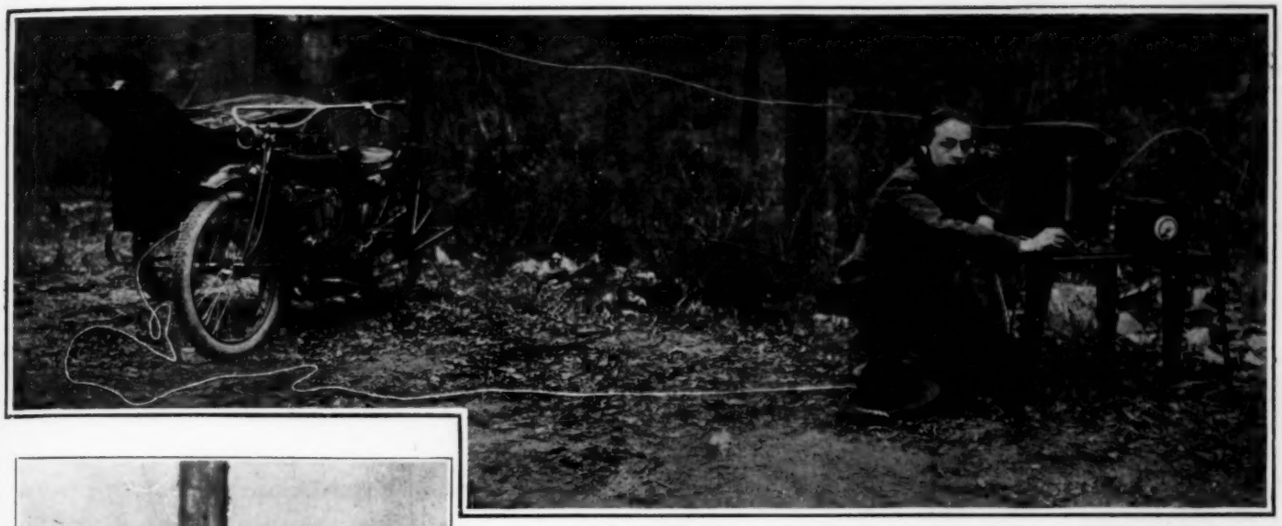
Working Model of No. 1 Relay Switchboard, Showing the Function and Operation of Every Piece of Apparatus in the Central Office. Used in New Bedford, Mass., District.—New England Telephone Topics.

A Standard Transmitter Before and After Going Through a Fire.—Mountain States Monitor.



Considerable Tangle; the Result of One of Our Perennial Sleet Storms in the Middle States.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.



A motorcycle radio telephone and telegraph set recently devised by a New York inventor for use by armies on the march or in the field. The equipment is contained in a metal side car attached to the motorcycle. The transmitting power is approximately one kilowatt, with a resultant radius for the wireless telegraph of eighty to one hundred miles and about half that distance for the radio telephone. Current is supplied to the telephone or telegraph by a high voltage direct current generator connected directly to an independent motorcycle engine contained within the side car. The antenna is supported by a light weight metal mast of tubular construction. The form is telescopic, so that the mast when collapsed can be easily strapped out of the way on the side of the car.

Mrs. Nellie Wheelock of Concrete, Wash., in her new vocation of "Linewoman" for the Skagit River Telephone and Telegraph Company. She is property district manager and collector, but handles 300 miles of wire because she cannot get good linemen.—Pacific Telephone Magazine.

Laying Conduit in Midwinter—in Florida, of Course—on the System of the Peninsular Telephone Company, Tampa.—Photo by the Automatic Electric Company, Chicago, Which Has Just Installed Automatic Equipment There.

Poles and More Poles at One of the Yards of the Sandpoint (Idaho) Cedar and Lumber Co.

STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

Independents Secure Washington Representative

Edward E. Clement, counselor and attorney-at-law, Washington, D. C., has been retained by the Independent Telephone Association of America to represent its member companies before the Interstate Commerce Commission, as resident agent. As is well known, the Interstate Commerce act provides that all companies sending or receiving interstate messages, must have a resident agent at Washington, D. C., upon whom the Interstate Commerce Commission can serve notices. The Independent Telephone Association of America has made arrangements with Mr. Clement to represent all of its member companies who care to take advantage of the opportunity, without any cost to themselves. In other words, the association includes the feature of securing a Washington representative without any charge other than the annual membership dues, which amount to five dollars. It is believed that many companies will avail themselves of this privilege. The association is to be congratulated in securing the services of Mr. Clement, who is well known in the telephone field. The association is mailing notices to its member companies calling attention to this new arrangement, and enclosing designation forms for its member companies to fill out so that Mr. Clement may be legally appointed as their agent.

Independent Convention at San Francisco

The Independent Telephone Association of America has decided to hold a convention in San Francisco, California, during the week of October 25, of this year. Many members have declared their intention of attending the Panama-Pacific International Exposition. Therefore, to obtain the most comfortable and desirable accommodations possible, special trains for independent telephone men and their friends will leave Chicago on Thursday evening, October 21 (exact time to be announced later), via the Rock Island Lines to Colorado Springs, where a stop will be made giving sufficient time to enable members of the party to take in the various points of interest, including Pikes Peak and Crystal Park, leaving Colorado Springs via the D. & R. G., at a time that will enable them to go through the Grand Canyon and Royal Gorge by daylight, arriving at Salt Lake City about noon. At Salt Lake City the members will be given a sight-seeing automobile trip throughout the city, leaving in time to pass through Feather River Canyon in daylight, which will allow an opportunity of viewing the most beautiful scenery that can be found on the western slope of the Rocky Mountains.

The party will arrive in San Francisco on Monday afternoon, October 25. Automobiles will meet them and take them to the Hotel Plaza, where rooms will be previously assigned.

Dakota Holds Operator's School

Minnesota, Montana, North Dakota, and Saskatchewan were represented at an important telephone school for operators conducted by the traffic committee of the North Dakota Telephone Association.

A warm address of welcome was delivered to the telephone operators by Secretary D. S. Hollenga of the Minot Association of Commerce, to which a fitting response was made by Paul Bunee of Fargo.

Then followed several excellent talks and instruction in the best manner of telephone operating for the purpose of bringing about more uniform methods. Actual demonstrations were made on a switchboard and other miscellaneous apparatus installed in the library room for the purpose, showing the good and bad ways of giving service. An elaborate display of blue prints and blackboard demonstrations helped in the educating of the operators. The library room was made into a model telephone exchange for the benefit of the students.

L. A. Mills, wire chief of Minot, gave some very instructive demonstrations, bringing out the basic principles of operating. In a very able manner he showed all the intricacies of the switchboard and explained how much telephone trouble could be done away with.

Western Electric Changes Directors

At the stockholders' meeting of the Western Electric Company a matter of special interest was the change in personnel of the board. Provisions of the Clayton law are evidently intended to prevent a company which supplies material, through the fact that its representatives have a place on the board of a common carrier, from exerting improper influence upon purchases of the common carrier. The Western Electric Company, which is largely owned by the American Telephone & Telegraph Company, is virtually the manufacturing and supply department of the telephone company, and the telephone company has been represented upon its board of directors, so that while the relation between the companies is the exact opposite of that at which the law was aimed, the companies technically come within the prohibited relation.

To comply with this law it was necessary either to adopt a method of operations between the Western Electric Company and the telephone companies which would increase expenses largely, or to drop from the board of each company all representatives of the other. Although the law allows two years in which to make adjustments, under the policy of the Bell system, when a law is known and understood, to comply at once, H. B. Thayer retires as vice-president and director of the American Telephone & Telegraph Company, and T. N. Vail and his associates in the telephone company retire from the Western Electric board, which has been reduced in number.

The new members of the board of the Western Electric Company are men who have long been connected with the company. The board as now constituted consists of Messrs. E. M. Barton, H. A. Halligan, W. H. Miner, A. L. Salt, W. P. Sidley, Gerard Swope and H. B. Thayer.

Ohio Cities Install Automatic System

The Ohio State Telephone Company, which recently took over fifteen independent companies in Ohio, is planning to install automatic telephone equipment in all cities where it has exchanges and in the rural districts as well, and thus to do away with the operators.

Full automatic service is now in use in Columbus, Akron, Dayton and Fostoria. Youngstown and the rural districts of Franklin county are soon to have automatic telephones.

Telephone Troubles in the Tropics

Paper Read Before the Institution of Electrical Engineers, England

BY W. LLEWELLYN PREECE

THE main purpose of this paper is to explain the serious difficulties met with in telephone engineering in tropical countries. The author proposes to take each section of a complete telephone system in turn, the subscriber's instrument, the exchange switchboard and the line, so that the various peculiar faults experienced may be more clearly understood. At the same time, as similar troubles are experienced not only in telegraph systems but also in heavy electrical installations, especially where overhead transmission lines are employed, he hopes that this paper may be of some interest to all branches of the electrical engineering profession.

INSTRUMENTS.

So far as white ants are concerned, we find that the use of teak practically prevents their ravages. The author has been told that in the Gold Coast this pest is so voracious that it attacks teak as willingly as any other wood; but he is inclined to think that this is an exaggeration, and he has certainly not heard of any telephone set being devoured by these insects or even attacked.

The large white ant is not, however, the only troublesome insect. One instrument a swarm of bee-like insects of Nigeria took a great fancy to use as a hive. Their entrance was the slot of the switch-hook, and the comb was formed in the interior. The comb was cleared out many times, but each time it was reformed by the insects until in despair the engineer had the whole apparatus removed. The spider is a real pest all over the tropics; it delights to retreat into the telephone case and to build for itself a nest therein; so that it is no uncommon experience to find instruments entirely hors de combat from the diligent work of this insect.

To circumvent the insect plague it is essential that these telephone cases should be sealed up as closely as possible. The switch-hook should carry a brass plate which keeps the slot in which the arm works entirely covered. It is also desirable to have no terminals above the instrument, but to take the conductors through holes into the case and seal up these holes. Besides this, the internal wiring should be made as simple as possible; the wires must not be bunched together, but well stapled to the body of the instrument in separate ways. It is generally found that enamel insulation with a silk covering is very suitable, though, as will be seen later on, enamel insulation does not always give satisfaction.

How many engineers would dream that in a tropical climate the ebonite sheath of a receiver would become soft and pliable? Yet the author has a receiver from the West Indies the sheath of which was softened with the heat, and when clasped behaved like "plasticine." Many others did exactly the same. Of course, this is easily remedied by using blocked brass sheaths covered with enamel; but one only learns such things by experience. In another tropical country a lot of trouble was caused by the insulating block which carried the contact springs in a capsule transmitter of a micro-telephone being warped by the damp heat, so that both springs touched the metal case of the capsule and short-circuited the microphone.

Happily, in most of the tropics the faults in the subscribers' instruments caused by lightning are very few, and so long as the engineer takes the precaution to fix the lightning protector at the point where the wires enter the house little trouble need be feared. Where the casual custom of fixing them near the instrument is followed it is not uncommon—as at least one engineer learned to his cost—for the building to be set on fire. Until the protectors were fitted to the eaves of the roofs outside the building walls the telegraph offices in Northern Nigeria were repeatedly burned down through lightning.

The only other trouble likely to be experienced with the subscriber's instrument is that due to maltreatment by the subscriber himself. It may be said that the same trouble is equally prevalent here, but the author doubts whether it is quite so bad.

EXCHANGE SWITCHBOARD.

There has been for some years past very considerable discussion concerning the question of what type of board should be used in the tropics, and until lately the craving of the tropical engineer was to have the up-to-date central-battery system. But the maintenance of really satisfactory insulation on overhead lines is almost impossible in the tropics, and if with this poor insulation a pressure of 24 or 40 volts was applied to the line, even moderately fair working of the system would be extremely doubtful. The author has, therefore, set himself strongly against the central-battery board, unless a government is prepared to place the whole system underground.

At present the author is entirely in favor of a magneto system, using either mechanically-restored indicators or incandescent lamps controlled by relays. Both these types of indicators have given satisfaction except for the various faults which he is about to mention.

Some two or three years ago many of us were very keen on using enameled wire almost for everything. The enamel appeared to be a very flexible, non-absorbent material, and one likely to maintain a high insulation. Experience of it, however, has shown that in the tropics it is not altogether satisfactory, especially for small-gauge windings of coils. Two colonies had boards equipped with enamel-insulated wires throughout, but in a very short time various relays failed.

On making an inspection it was discovered that there were disconnections in their windings. On unwinding the coils tiny green spots were seen, apparently caused by the damp acting on the copper. These seemed to be due to uneven coating.

Certain types of the mechanically-restored indicators have also given some trouble, especially the "eyeball" type. This is sometimes owing to dust and damp clinging to the eyeball and preventing it rotating.

The question of operators causes the traffic department considerable worry. Usually European

women cannot be used, and recourse must be had to native labor of poor quality. With the only available operators, 60 lines to a position is all that can be managed in some places, and 80 lines per position is generally quite as much as can be handled. It will be understood, therefore, how the telephone departments long for an automatic system.

One other most trying and frequent worry in an exchange is the objection that subscribers have to "ringing off" after a conversation. The complaint is heard elsewhere, but it is nothing like so widespread as in the tropics. To avoid this source of annoyance and the consequent delays in freeing cord circuits, an automatic clearing signal has been fitted to all boards in the Malay States, even to those for 50 subscribers. The diagram shows the arrangement. A small lamp and clearing relay are used, the lamp obtaining current from large "sack" Leclanché cells. Two clearing relays, one for each subscriber, are inserted in the cord circuit, each consisting of two high-resistance coils.

These coils are tapped off the two through conductors, which are broken by condensers, and the inside connections are joined to the battery. When the receiver is off its hook there is a circuit from the bat-

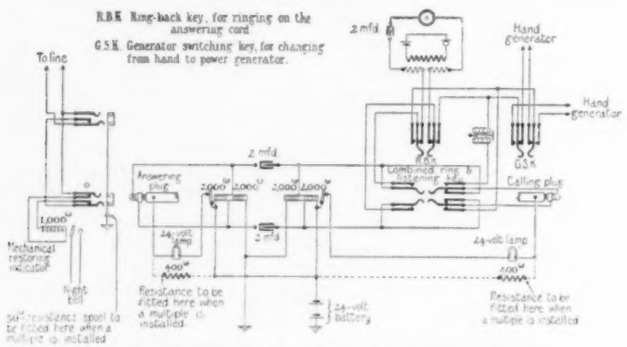


Diagram of Connections of Automatic Clearing Signal.

tery through one coil out to the line, through the subscriber's induction coil, back by the other line and coil to the battery. With these coils, each of which has a resistance of 2,000 ohms, the current is very small and does not affect the speaking, but is sufficient to hold up the relay armatures. As soon as the receiver is returned to the hook the circuit is broken, and the clearing relay armature falls back and completes the lamp circuit. The advantage of this particular arrangement is that there is a very remote chance of the relay armature falling back and causing the lamp to glow, unless the subscriber's circuit is broken, so that the subscriber is not likely to be cut off in the middle of a conversation through a faulty clearing signal—one of the most irritating faults that can happen in a telephone system.

LINE.

The normal type of overhead construction now employed in most tropical countries is fairly well standardized. The poles used are either of a type with wrought-iron taper tubes and cast-iron bases, or of the Hamilton type, which are built up of tubes of riveted sheet steel. In most parts it is hopeless to use wood poles, owing to the prevalence of white ants, which in a very few years demolish the whole of the interior of such poles. Arms are of hard wood or of iron. The atmosphere, with a humidity of 80 or 90 per cent, naturally has considerable effect in reducing the insulation resistance, as is the case here in times of damp fog, when the humidity is about the same as the normal value in the tropics.

A more troublesome factor, however, is the vegetation, more troublesome in that, while the clearing away of these trees would be of very great assistance in keeping up the insulation resistance, there is the high cost of doing this in most places and the reluctance of the government and the public to allow this work to be carried out. Mr. Lawson, the chief engineer in Southern Nigeria, was able to persuade his government that a 100 foot clearance through the forest was essential, and, as labor is there cheap, this was allowed, the annual clearing of the undergrowth thus being effected inexpensively. The result is most satisfactory. In Java the chief engineer had the wires suspended down the center of the road by means of cross-suspension wires from poles on either side, or by using the trees as poles. This is found very satisfactory as regards insulation, but to the author it appears somewhat dangerous for the public. If a wire were to break, anyone motoring along that road might be caught by the broken end and thus suffer serious damage.

Another line trouble that the tropical engineer is bound to experience is caused by insects. This sounds absurd, but in such climates Nature is, if possible, more prolific with insect life than with vegetation, and some insect groups delight in making their homes between the petticoats of insulators. The author would be glad to hear any suggestion for dealing with this difficulty. Oil insulators do not provide a solution, but glass insulators appear to have kept free in some cases, and may, perhaps, be suitable.

Mr. J. Sayers, of the Midland Railway, found that the use of oil insulators on his "through" quadruplex lines between Derby and St. Pancras was most efficacious, and that they maintained satisfactory insulation even in the worst weather; it is thus possible that if oil insulators of glass which would not attract insects were used in the tropics the results should be equally advantageous. Unfortunately, such insulators are not at present obtainable.

Another widespread source of line trouble in the tropics is lightning. In many places thunderstorms are of almost daily occurrence throughout the greater part of the year. In certain towns a single storm will often result in 50 per cent or more of the subscribers' telephone lines being grounded at the pole boxes. This trouble can, however, be cured to a great extent by using the vacuum type of protector, in which the two carbon blocks are inserted in an exhausted glass tube, the opposite surfaces being serrated and fixed about $\frac{1}{16}$ inch apart. These protectors are now used to a considerable extent by Mr. Cadman in the Malay States, and are, the author believes, found to be quite satisfactory. Occasionally an extra heavy discharge will burst the tube, but they are very easily replaced. This possibility, however, makes it essential that fuses shall also be inserted, for if a discharge were so heavy as to burst the protector the line would be no longer protected and a subsequent discharge might damage the cable seriously.

The one disadvantage of these protectors was their size, which involved the use of a very large pole box, even for 25 lines; but a new type of box designed early this year has practically solved this difficulty.

The protectors are arranged in two vertical rows on either side of a long and narrow chamber, which holds the fanned-out conductors of the underground cable, and can be filled up with bitumen. Fuses are arranged behind the protectors at the back of the box, and a double sheet-iron cover encloses the whole box. From the top a wrought-iron pipe goes up the pole, carrying the leading-out wires, which latter are invariably twin-conductor lead-covered cables, each twin terminating in accordance with the British Post Office practice, in two Purves and Sinnot terminal insulators. These insulators, owing to their covered-in and bitumen-filled jointing chambers, are found to give very great satisfaction. Altogether this makes a well-enclosed compact system for these distributing poles, with good lightning protection and satisfactory insulation.

A letter from Mr. Sayers, of the Midland Railway, dealt with the subject of lightning protection, and described a method of guarding a line of wires from lightning by erecting an earthed line along the tops of the poles. This practice has been applied to electric light and power lines for some years, but the author believes that though the suggestion had been made before, Mr. Sayers was the first to test this method on telegraph or telephone lines. An iron wire is stapled to the tops of the poles, and also connected to their earth wires. At each end it terminates in an earth plate. This arrangement has been found most effective in guarding the lines from lightning. The author would, therefore, like to call the attention of all engineers in the tropics to this arrangement, and to suggest that they should try this earthed wire on their telephone lines.

For underground work in the tropics the usual practice is to use armored lead-covered air-space cables terminating in boxes on distribution poles, and hitherto the engineers have followed the British Post Office practice of making the joints so that dry air can be periodically pumped through.

Wireless Mine Telephones

In Germany the government has for some time past urged the installation of telephones in mines, and as the usual troubles in the way of damage to wires, etc., occur equally in Germany as elsewhere, the inventor of the system herein described, Herr Reineke, experimented with the view of overcoming these difficulties. As a result his system has now been in regular use for two years at one pit in Westphalia where no other method of signaling is used, says T. M. Winstanley Wallis, in the *Engineering Magazine*.

In using the term "wireless" it is advisable to explain that the system is entirely distinct from that commonly used in wireless (or spark) telegraphy. Attempts have been made to employ that system in telephony, but there are serious objections that would pervent its general use in mining work.

The current from the transmitter is converted to high pressure by means of a transformer contained in the telephone-case. As the high-pressure or secondary winding of the transformer is connected to the ordinary rails or pipes in the pit, it communicates to them a charge of electricity, which spreads over the whole system of rails throughout the pit, and varies with the fluctuations of the primary current in the transmitter circuit of the telephone. It is unnecessary to make any special provision to insulate the rails or pipes, or to connect the adjacent lengths electrically.

It is interesting to note that the invention was led up to by the discovery that the conditions of distribution of electric charges underground are entirely distinct from the conditions that hold on the surface of the earth, and the working of the system largely depends on this fact, which was demonstrated for the first time by the inventor.

Speech can be received by connecting telephones to the rails or pipes at any point of the system, either by bridging a sufficient length so as to obtain a suitable difference of pressure, or by connecting between the rails and pipes, if these exist, or, as is sometimes convenient in the case of portable instruments, by connecting to an antenna consisting of a loose coil of wire, which may be laid on the floor or hung on the timbers.

It is possible to tune the relays so that each will respond only to its own particular signal, and thus any one station can be called, but in mining work this is usually not necessary or desirable, and the different stations are called by giving one, two, or three rings, as prearranged, whilst it is always possible, by a special signal, to call all the stations and speak to all simultaneously. The current required is furnished by an ordinary battery; in fact, in outward appearance the telephones are exactly similar to an ordinary mining telephone.

The portable instrument, which can be carried about and used in any part of the pit to which the rails extend, is contained in a strong metal case, the total weight being about 20 pounds. This telephone can either "ring up" the other stations or be "rung up" by them. A smaller or pocket instrument is also made which can ring up other stations but cannot be called by them. Thus each official provided with an instrument can give notice of any accident and ask for assistance from any point in the mine. A telephone can be fixed at any convenient position on the surface and connected to the headgear, if of iron, or to the winding-rope or pipes which go down the shaft. This telephone can speak to any of the telephones underground if necessary, but it is usually found more convenient to arrange for it to speak to the station at the pit-bottom only, and for this station in turn to speak to the underground telephones. In metalliferous mines, where a number of different levels run from the shaft, communication can be established from one level to another as required, the presence of the ore-bodies not affecting the speaking in any way.

A further most important application of the system is that of speaking from the moving cage directly to the winding-engine-house, and for the latter position the inventor has designed an ingenious method of operation. The telephone is mounted on a standard fixed close to the engineman's ear. On receiving a call, he has only to put his ear to the receiver, and the slight pressure is sufficient to switch in the telephone and enable him to communicate with the cage, without removing his hands from the levers.

Pennsylvania Companies Must Serve 10 Day Notice

Pennsylvania telephone companies would be prohibited from discontinuing service to patrons without first giving ten days' written notice to the patrons affected, by a bill introduced in the House. The bill also provides that no bill for service shall be considered due until service shall have been rendered, regardless of contracts to the contrary. A clause in the bill makes the offender liable to $500 fine and damages.

Tentative Standards for Illinois

Illinois Public Utility Commission and a large number of representatives of various telephone interests, held a conference in Springfield, January 29. Tentative standards was the subject of discussion and many prominent telephone men were among the speakers, including Ben. B. Boynton, C. H. Rotger, H. L. Reber, E. G. Glandon, and Mr. Larned.

The conference was quite successful in that the tentative rules were acceptable to all interests with the exception of a few minor details and changes, especially relative to the phraseology in Rules 7 and 8, in which opinion differed as to the proper standard for prompt service. Some of the speakers believed that the standard should be better than 85 per cent.

A summary of the tentative rules is as follows:

Rule 1. The lines and equipment of each telephone utility shall be so constructed and maintained as to eliminate, as far as practicable, all cross talk and noise resulting from leakage and induction, and to insure good transmission over local exchange lines and long lines ordinarily used in the transmission of messages or conversations.

Rule 2. On new construction not more than four subscribers shall be connected on any local exchange line, and not more than ten subscribers shall be connected on any rural line having a length of eight miles or less. On rural lines of greater length this number may be exceeded, but in no case should more than 15 subscribers be connected on any rural line. Existing rural lines now having more than 15 subscribers connected shall be reduced to 15 subscribers or less as promptly as practicable.

Rule 3. Each telephone utility furnishing service between any two cities or villages should maintain at least one trunk line for through traffic between such cities or villages with which no subscribers' instruments are connected. Where the through traffic warrants it, additional lines shall be provided sufficient to maintain adequate service.

Rule 4. Each telephone utility shall make such tests and inspections of its lines and equipment as may be necessary to insure the maintenance and operation of such lines and equipment at the highest standards of efficiency.

Rule 5. Each exchange shall have sufficient central office equipment to meet all requirements and shall have sufficient operating force to handle the traffic at all times adequately and efficiently. Traffic studies shall be made at regular intervals by each utility in order to provide for necessary extensions to the equipment and additions to the operating force, and to demonstrate to the commission that sufficient equipment is in service and the necessary operating force employed to handle the traffic with reasonable facility.

Rule 6. Every telephone utility shall make reasonable efforts to provide for meeting of emergencies such as failure of lighting or power service, sudden increases in traffic, illness of operators, and should issue instructions to its employes governing the methods to be followed in promptly clearing trouble resulting from storms, fires and other emergencies which seriously affect the service.

Rule 7. Any telephone exchange serving more than 500 subscribers shall be considered as giving reasonably prompt service if 94 per cent of all the calls are answered in ten seconds or less. All other telephone exchanges shall answer at least 90 per cent of the calls within ten seconds. Where the traffic is insufficient to require the entire attention of an operator and the exchange is operated in connection with other work, slower service may be adequate.

Rule 8. Speed of service for exchanges of each class should conform to the following standards:

	Class 1	Class 2
	Per cent	
(1). Speed of answer to line signal	94	90
(2). Speed of answer to flash signal	70	65
(3). Speed of disconnection after completion....		
(4). Speed of answer by long distance recorder..	94	90
(5). Percentage of errors.....	5	5

Rule 9. Each telephone utility shall adopt suitable rules and instructions governing the methods and phraseology to be used by operators in the handling of all calls.

Rule 10. Telephone directories of exchanges serving more than 1,000 subscribers shall be revised semi-annually. The directories of all other exchanges shall be revised at least once each year. Directories for exchanges serving more than 1,000 subscribers should contain, in addition to the alphabetical list of subscribers, a clasified list of business subscribers. All directories should be dated and should contain a schedule of the exchange service rates, the rules and regulations governing the conduct of the business of the telephone utility, and such instructions as may be necessary to inform subscribers of the action they should take in order to obtain adequate and efficient service.

Rule 11. Rules and regulations governing toll service shall be posted in all public pay stations, and printed in all directories.

Rule 12. Every telephone exchange shall maintain an accurate record of all complaints, interruptions or irregularities of the service, such record to include the date and time the trouble was reported, the nature of each complaint or irregularity, the duration of same, the action taken to clear the trouble, and the date and time such trouble is cleared. All reasonable efforts should be made to eliminate interruptions and irregularities and to properly care for all complaints that arise.

Rule 13. For the purpose of assisting the commission in enforcing these standards, each telephone utility shall file with the commission the name and address of the official or employe with whom service complaints and reports of irregularity shall be taken up to insure prompt and careful attention to such complaints and reports. One copy of each issue of the directory shall be filed with the commission at the time of the distribution of such directory.

It was decided that toll service should be properly routed both for efficiency and fair play to companies where more than one is involved. Toll circuits should be tested each morning and especially after storms. Where trouble on circuits arises where one company uses the lines of another, reports should be made at once to that company maintaining the particular line having the trouble.

Timing apparatus should be installed to secure accuracy and a complete record of the toll lines should be kept by service inspection.

Operators on long distance lines should be instructed to cultivate distinct articulation, low tones and a pleasing voice.

Inter-State Sale to Bell Certain

The time limit for depositing with the Northern Trust Company the stock, bonds and trust equipment notes of the Inter-State Independent Telephone & Telegraph Company for sale to the Bell interests has expired and sufficient securities have been deposited to make a sale practically certain.

This company serves Aurora, Elgin, Springfield and other Illinois cities with twenty-nine exchanges. The Bell interests now own 51 per cent of the stock, 54 per cent of the bonds and 70 per cent of the equipment trust notes. The capital stock is $2,447,660 and the bonded indebtedness $2,500,000.

A contract was secured with the Bell to purchase the rest of the outstanding securities if 90 per cent of the three issues were deposited by April 15. Holders of trust notes have deposited 96 per cent, bondholders have offered over 90 per cent, but the stockholders, being offered but $4 a share, have not produced 90 per cent.

It is now considered probable that the Bell will buy the bonds and equipment trust notes at the contract price, $46 for the bonds and $70 for the trust notes. It is probable that the stockholders, having failed to come in, will be left to shift for themselves under a foreclosure.

Consent of the Illinois Public Utilities Commission to the deal is said to be assured by the fact that the security holders, through a committee, are asking the sale as a measure of relief. The consent of the federal authorities also is said to be assured.

Kempster B. Miller.

Valuation of Physical Properties

Address Before the National Independent Telephone Association

BY K. B. MILLER

IN this informal talk it is not my purpose to make any attempt at a complete analysis of the valuation of the physical part of public utility property, but rather to devote my attention to a few of its phases which seem to have been generally misunderstood among the rank and file. While the subject is not new, it has never before assumed anything like its present importance in the public mind, and it is therefore very new to most people. The confusion which exists concerning it is not, therefore, to be wondered at. Much of it is due, in a large measure, to the loose talk and inaccurate writing that has been indulged in, not only by property owners and appraisers, but by some of the commissions and courts as well. It seems to me that, until a few of the simple and fundamental points are cleared up, it is hopeless to get much light on the really subtle points that are met at every turn in the pursuit of the truth about this very complex subject. I will deal, therefore, with only a few of the fundamentals.

The first fundamental, about which almost universal confusion exists, is the distinction between *cost* and *value*. The courts, commissions, engineers and laymen have, in a large number of cases, used these two terms interchangeably and often without any apparent distinction in their minds between them. Value, however it may be defined, is likely to differ widely from cost, and the more widely the two are separated in point of time, the greater is the difference likely to be. For instance: Will anyone say that a piece of real estate in what is now downtown Chicago, which 50 years ago *cost* ten dollars, has a *value* of no more than that now? Or is the *value* of a crate of apples which has rotted on the owner's hands to be measured by the *cost* of those apples a month ago?

I have stated that the greater the period which separates the cost time—that is, the time of purchase—from the time of valuation, the greater the difference between cost and value is likely to be. Conversely, it is true that the closer together these two times are taken, the more nearly is cost likely to approximate, and be a true measure of, value. When the date of cost and the date of valuation are coincident, then, and only then, is the cost likely to be a fair measure of the value. It is for this reason that the courts have held that the *cost of reproduction* is one of the important things to consider in arriving at the value of a physical property. Unfortunately for the reproduction theory of determining cost, and by it measuring value, it is not feasible to tear down the plant and build it up again so as to find out how much it would cost to reproduce it now. The only alternative, in order to arrive at the cost of reproduction, is to make as close an estimate as possible of the hypothetical reconstruction of the plant at the present time. This does not mean that in this hypothetical process we are to assume impossible things, for instance, that the plant is to spring into existence over night, as by miracle. Obviously, we must confine ourselves to what is humanly possible. This means that we must allow a reasonable period for our hypothetical reconstruction. We must consider not only those costs which enter into the purchase of material and the payment of wages, but also all collateral costs which would reasonably and necessarily enter into the construction of the plant. These include interest on the capital invested and lying idle during the construction period, the costs due to taxes and insurance during the construction period, the administrative, engineering and legal expenses necessary in order that the plant may be constructed properly and economically, as well as all the cost of non-productive labor and all incidental charges that would in all probability arise during the carrying out of the construction.

I prefer to employ the term *collateral costs* to designate all those costs over and above the ones more directly associated with the purchase of material and the labor of putting it into place, rather than the more common terms *overhead* and *indirect* costs, because I believe it is more nearly descriptive.

Because these collateral or overhead costs have to be estimated separately from the items directly associated with labor and material, and perhaps because they are often computed as a percentage of those items of direct cost, many people have reached the conclusion that there is something mysterious about them and that they are, in fact, intangible costs. I will confess that these costs, as put up by some appraisers, are mysterious, but there could be no greater mis-statement of fact than to call them *intangible*. They are just as real, just as tangible, as the costs which enter into the purchase of poles and wire. The man who is putting up his money to build the property will find that the money spent for these necessary items of collateral cost is just as real as that which he spends for the laborer's hire. They are costs which necessarily enter into the construction of the physical property and are, therefore, directly involved in the reproduction cost of the physical plant.

Now, one of the questions which has caused much confusion and concern is: What is the proper percentage to allow for these collateral or overhead costs? We have all heard that the Wisconsin Railroad Commission customarily allows 12 per cent. You have heard that other commissions have allowed as much as 26 per cent, and, perhaps, that McMeen & Miller in some cases have allowed 25 per cent. Apparently someone is wrong, but, in reality, there is no proof on the face of things that all of these percentages may not be right, even in the same instance. I have two propositions to put before you in this vital matter:

First, that it is folly to apply the same percentage for all cases.

Second, that even in the same case, widely different percentages may be perfectly proper and arrive in the end at the same result.

As to the first of these propositions, the consideration of such items as interest and taxes alone will show the absurdity of applying the same collateral cost percentage for all sizes and conditions of property. It is conceivable that a plant in a small town could be built in six months and that the average time during the construction period would be, say, three months. With interest at 6 per cent per annum, this would mean that the item of interest during construction would amount to 1½ per cent of the total capital invested. It is equally conceivable that another plant, even with the most vigorous prosecution of the construction, might require four years to build. It would be impossible to economically reconstruct the plants in many of our large cities in that time. Under this assumption of a constructive period of four years, the average time of investment for the entire amount involved might be somewhere near two years, and with interest at 6 per cent per annum *the interest during construction* item alone would, in this case, be 12 per cent.

We thus have variation of from 1½ per cent in the case of the small property, to 12 per cent in the case of the large, for this one item alone. A little consideration will show that time enters as an element into nearly all of the collateral costs, directly, in regard to interest, taxes and insurance, and indirectly, in nearly all the others. This consideration of the time element alone is sufficient to show that there is no rhyme or reason in always applying the same percentage for collateral or overhead costs.

Coming now to the second proposition, I wish to show that the total amount of the overhead cost to be applied in any given case, assuming it is to be applied as percentage, may vary between even wider limits than 12 and 26, as already cited, and still be perfectly proper. The whole question resolves itself into what the appraiser has included in his unit costs directly associated with the labor and material items and what he has included in his collateral costs. Obviously, if one man in making an appraisal of a property puts his incidentals, waste and breakage, his tool expense and cost of handling material into his unit costs—and it is perfectly proper to do so—he will have less to account for in his collateral or overhead cost than will the man who, in appraising the same property, builds up his unit costs without these elements and accounts for them in the collateral costs. The one man may have collateral or overhead costs amounting to 12 per cent, the other amounting to 26 per cent, and both may be right. You may ask: Why should these two appraisers not act alike in this matter? Why should not each include the same elements in his direct unit costs and in his collateral costs? A wide experience in such matters has shown me that one method is most adaptable to one particular case and another to another. The scheme of accounting employed by the company whose plant is being appraised will often facilitate unit costs being determined in one way and prohibit their being determined in another.

As a specific illustration of the possible and proper difference in overhead percentages, I will refer to a discussion which took place before the Western Society of Engineers, following a paper delivered on March 24, 1913, by Halford Erickson,* formerly a member of the Wisconsin Railroad Commission. When questioned on the subject of the 12 per cent, which the Wisconsin commission usually allowed for collateral construction costs, Mr. Erickson stated that the "visible" percentage which the commission allowed varied from 12 to 15 per cent. He also said that if 10 per cent contractor's profit, which the commission always allowed, were taken out of the unit costs and added to the overhead costs, the figure for overhead charges would run "somewhere in the neighborhood of 20 per cent." This illustrates the point I am making nicely. If the contractor's profit allowed by this commission is put in the unit costs, the overhead percentage is from 12 to 15. If it is taken out of the unit costs and put into the overhead, the percentage for overhead charges is increased to about 20.

Personally, I believe that the appraiser should in all cases take pains to be perfectly frank and clear in his exposition of the make-up of the unit costs with which he builds up his direct construction costs and the make-up of his collateral or overhead costs. The failure to do this, and also the lack of understanding on the part of some of the courts and commissions, is, in large measure, responsible for the confusion which exists on this very simple question. I say this without the slightest intention of criticizing the excellent work that is being done by some of our commissions and engineers. The whole subject is in a state of evolution. All of us who have been working in this field have seen new light as we progressed, but we surely have not yet seen it all.

Taking up another phase of the subject, I am inclined to deplore the almost exclusive use of the percentage method of estimating collateral or overhead costs. It often leads to illogical results, and assuming sufficient familiarity with the handling of large construction enterprises, there is often presented a better way of arriving at these costs, or at least a good way of checking the reasonableness of the percentages applied.

Percentage, of course, is the logical thing by which to figure interest. But even here, instead of adopting the usual method of applying half the interest rate per annum to the total investment, or all of the interest rate per annum to half the investment (an approximation which becomes true only when the money is spent at a uniform rate throughout the entire construction period), it is better in estimating the hypothetical reproduction of the plant to make up a construction schedule. This schedule should extend over the construction period and show just how much will have been done and how much money will have been expended at various assumed dates during this period. With such a schedule, which it is well within the province of any good construction engineer to make, the figuring of the interest during construction becomes a mathematical computation rather than a guess.

It is the usual custom to estimate the administration expenses, the purchasing and warehouse expense, and other similar items which enter into the collateral or overhead costs, on a percentage basis. I have found in a number of cases that it was possible to estimate pretty closely what the organization and expenses would be for carrying out certain phases of the collateral or overhead work during the construction period, and on this assumption to make a calculation with which to check previous experience. To illustrate, it is feasible to set up with fair accuracy a hypothetical organization for conducting the warehouse and purchasing affairs of a large proposed con-

struction enterprise. In case of a telephone exchange, one would know that a purchasing agent was necessary, if the right kind of material was to be purchased at the right prices.

According to the size of the job a fairly close estimate may be made as to the number of clerks and other assistants that this purchasing agent should have. The requirements for warehouse space and pole yards also can be easily estimated for any given town, and the rent of these, together with the wages of the men necessarily engaged in handling material, in watching the property, or in other capacities, figured out. By giving the matter sufficient thought, an engineer with the proper experience will find it possible to arrive at a sum for these expenditures in which he will have some confidence. I do not mean that this should be the only criterion for this class of collateral costs. What I do mean, however, is that, assuming sufficient experience and analytical power, it will arrive at a result that is probably more accurate than the usual percentage, which, as a rule, has been handed down by word of mouth and bandied about so long that no one knows where it came from.

If an engineer has fortified himself with such an analysis as I have just referred to, he will at least be able to show the reasonableness of the percentage he uses if he adheres to the percentage method. And in presenting his case to court or commission he will not have to fall back on that insipid statement that he has used a certain percentage because someone before him had used it. This is likely to lead to the embarrassing question, "Where did that percentage originate, anyway?"

The thing that is needed in appraisal work, and the thing that will do most to wipe out the divergence of opinion that often exists between courts and commissions, on the one hand, and property owners on the other, is for the engineer to so prepare his appraisal that it can be intelligently analyzed by others. It is by no means easy to do this. Too often exact data as to the cost of doing things is not obtainable, but this situation is rapidly improving with the increasing realization of the importance of knowing such things. As our methods of accounting become more standardized and better understood, and as the public probably losing large sums of money in their property value by not being able to prove all the elements which enter into their costs, we may look for further improvement. At present I am frank to say that in many years of experience I have never made an appraisal of a public utility property in which it was possible to determine from the books just what the average cost of doing the various kinds of things were. This is due to no attempt on the part of the companies to conceal anything in their books, but rather to the fact that the books, the work orders, and the other documentary evidence were not primarily intended for that purpose.

Too often the costs on which an appraisal is based are made up by more or less reliable data as to the actual cost of some few small jobs. Usually the jobs which a good foreman likes to remember and talk about are the ones which went smoothly from start to finish, where the digging was easy, the weather fine, and where he made a record for low costs. The ones on which his trenches caved in, or his men struck, are the ones he likes to forget. The costs of these may be a thousand per cent higher than the low ones, but they are the ones most likely to be thrown out because abnormal, or forgotten. Yet the money spent was real and necessary. Such costs should enter with the low ones into the general average, for they will occur again.

Then again, in making up cost data it is almost impossible to get in all the items. The inexperienced appraiser is likely to see not much more than the mere labor and material, and he is likely to miss a good deal of that. On the whole, the conviction grows on me that the unit costs generally applied in telephone property appraisals are too low, whereas, at first sight, they often appear unreasonably high.

The total of all costs directly associated with labor and material, plus all the collateral or overhead costs, go to make up the reproduction cost of the physical plant. This, as previously stated, is not necessarily value, but it is one of the best measures of it. Courts have held repeatedly that reproduction cost is not the only criterion of value, but that all considerations that might have any effect must be taken with it in order to arrive at value.

Now, as to *present value* of the physical property as against the value arrived at by the reconstruction cost method, this is the value which takes into account the depreciated condition of the property. If value new is to be measured by the reproduction cost alone, then present value would be the reproduction cost less the actual accrued depreciation. The determination of this, of course, involves a consideration of the condition of the plant, and this can be determined only by inspection. That mature judgment is needed in this, goes without saying. By assigning a condition percentage to each element of the physical plant, a composite physical percentage may be arrived at, and from this the so-called present value determined.

It must be remembered that a piece of property does not, as a rule, depreciate toward zero value, but rather toward its junk or salvage value. Frequently, appraisers determine percentage condition almost exclusively by age considerations. The logic of this is hard to see. It is true that age is one of the important points to consider in determining condition, but to use it as a sole, or even as the principal, criterion is obviously improper. For instance, a desk stand five years old may be, to all intents and purposes, practically as good as new. A little nickel plating would make it impossible to distinguish from a new one. Are we to say that because telephones are usually given an average life of ten years, that this five-year-old desk stand has depreciated 50 per cent and only has half of its original value? This subject of the present or depreciated value is too large a one to discuss in all its phases here. Obviously, it is the sound judgment of the appraiser that, in the end, must be the principal guide in setting the value.

Perhaps the most important point in connection with present value is: For what purpose is it to be used? To those who contend that the present or depreciated value is the proper one on which to base the rate of return that a public utility should be allowed to earn, I have this question to ask: Why should any investor ever put a dollar into a public utility enterprise if he knows that the return he is to be allowed to earn will be based, not on his investment, but on a constantly diminishing sum? The most enlightened of our public utility commissions and courts have stated that a rate of return should be allowed

public utilities sufficient to assure the necessary inflow of capital as additional money is needed for betterments and extensions. Obviously, if this is not done, our public utilities must fail.

In this whole talk I have confined myself to the physical property value and have not considered the other elements which go to make up total value. The total value of a property rests not only in the physical plant, but also in the fact that this plant is, so to speak, endowed with life—that it is a going plant with an organization and business that is actually giving telephone service and receiving remuneration for it. This value, over and above the material value of a dead plant, does not spring up automatically with the creation of the physical plant, but must be brought into being by the lapse of time and the expenditure of energy and money. It is classed among the intangible elements of value and is often referred to as *going value,* or, when computed on the reproduction theory, it is sometimes taken to be the cost of developing the business. This is another and one of the most important phases of the subject with which I am not dealing in this talk.

Co-operative Club Plan for Operators

The Cumberland Telephone and Telegraph Company promotes a plan at its stations in Chattanooga, Tenn., for recreation and economical lunches for employes that never fails to interest anyone happening to hear of it. There is nothing new in the idea of a company's looking out for the welfare of its force of workers, but this particular plan possesses the merit of co-operation and two years of successful operation.

One hundred operators belong to an operator's club which was organized by the management with a twofold purpose of providing wholesome, substantial meals at minimum price and an attractive place in which to spend the fifteen minutes rest period allowed every girl at intervals of four or five hours work in addition to one hour at noon recess. This system of rest periods is observed night and day at the exchanges. In order that the girls fully benefit from the brief fifteen-minute respites a retiring room in the building was necessary.

So well worked out is the plan that five-cent lunches —sufficient to appease the heartiest appetites—are served daily from 11 a. m. to 1:30 p. m. and an inviting sitting room is used in turn by operators throughout the day. At noon hour it becomes a most homelike place, presenting the girls in happy enjoyment of something in which they feel they really share.

The company furnishes the quarters, light, fuel water, two negro cooks, coffee, tea and sugar—in all spending approximately $100 a month. There are no dues and all girls enployed are automatically members of the club. The entire 100 make use of their membership privilege. In turn, the management declares the result is more contented and more efficient employes, who fully pay for the expenditure represented. J. M. Harris, traffic chief, is especially interested in the plan and gives it personal supervision and encouragement.

Officers of the club who are chosen from its members plan the menus, buy the groceries, meats and other supplies, keep account of and pay all bills out of receipts. Nothing is cleared on the lunches proper, but $30 to $40 is averaged each month on ice cream, cake, pie, fruit, soft drinks, which are sold at five cents an order as extras. This money is held in the treasury and is spent as the girls decide. Sometimes this sum is used for loan funds or for flowers for ones that are ill, picnic trips, curtains or magazines. A talking machine and a piano player have been bought by the club.

As an instance of what is served for five cents is the menu used Friday, which showed fried fish, creamed potatoes, peas, sliced tomatoes, bread, coffee, iced tea. Thursday the menu was as follows: Irish stew, fried corn, sliced tomatoes, bread, coffee, iced tea. Chicken is always served once a week. Breakfast and supper are served for the girls who work at night, while sandwiches may be secured at all hours. The operators may bring their lunches from their homes and obtain either coffee or tea free at the lunch counter.

The third floor of the exchange building has been set apart for the operators and is divided into sitting and lunch room, hospital room, kitchen, and section for lockers.

At the Hemlock exchange, where about twenty operators are employed, the same plan is promoted upon a smaller scale. A gas plate and one table form the equipment and the girls prepare and cook their own luncheons.

Massachusetts May Ask Telephone Inquiry

Governor Walsh may send a special message to the Legislature calling for an investigation into telephone rates and service in Massachusetts, as the result of a discovery that the recommendation of the commission for such an investigation has apparently been sidetracked in the Senate.

The commission, in a report on telephone matters recently issued, stated that it had the authority to make an investigation, but no funds. The House referred the report of the commission to the committee on mercantile affairs, and the matter then went to the Senate on a question of concurrence. The Senate, by a voice vote, refused to concur with the reference, and that action threw the report back into the House, where it is on the files of the clerk.

Opinions differ as to whether it would be necessary for a majority vote or a unanimous vote to take the report from the files, but the governor can bring the matter formally before the Legislature through a special message.

The action of the Senate does not mean that all avenues for an investigation have been closed, as the committee on mercantile affairs has before it a portion of the governor's inaugural message calling for an investigation of a similar nature, and it would be possible for the committee to report out some sort of an investigation measure based upon the governor's recommendations.

Passage of Minneapolis Bill Certain

The conference committee of the House and Senate which has been considering the Minette-Burrows Telephone bill, have agreed to the Senate amendment eliminating the referendum feature of the proposed law.

After passing the House without a dissenting vote, the bill went to the upper body, which added the amendment. In this the House declined to concur, and a conference committee was appointed.

The measure would place telephone companies under the jurisdiction of the Railroad and Warehouse Commission, which would be empowered to fix rates.

Telephone Talks

The May, 1915 Installment of an Instructive Serial Course for all Telephone Workers

BY G. W. CUMMINGS AND ARTHUR KNEISEL*

THE regular business of the Technical Club required but a few minutes of the meeting for its transaction and the President had no more than announced that the meeting was open for the discussion of practical telephone subjects, suggesting that the next logical subject for discussion would be the story of the subscriber's apparatus at central office when the Cable-splicer's Helper and the Installer's Helper both arose. The former was recognized by the Chair and voiced his objection to such a discussion. "You boys are getting in deep water for me again. You have talked of resistance and current and of high retardation and electrical pressure and fall of potential until I am all mixed up. I wish you would please explain some of these terms before we go any farther and perhaps I may be able to keep up with the discussion."

"Them's my sentiments," chimed in the Installer's Helper.

"I would suggest," retorted the President, "that you boys would spend a little midnight oil in reading; almost any subject might help to improve your English, and if you will put a little time on some book relative to your work you may be able to get some of the information you want. Such reading taken in connection with these discussions would no doubt accelerate your rate of acquiring knowledge."

"What book would you suggest?" replied the Cable-splicer's Helper.

"There are a number of good books on this subject, the most widely known of which are Miller's American Telephone Practice, and Telephony by McMeen and Miller; or if you want a book which is more closely allied to our particular work get Cumming's Electricity and Magnetism in Telephone Maintenance. This book is not so large and consequently is less expensive than either of the other two. I do not mean to discourage your asking questions during these discussions, but wish to encourage you to devote some of your spare time in the evening to self-improvement. Your work for which the company pays you consumes eight hours of the day. This leaves you sixteen hours of the twenty-four to prepare yourself for increases in salary."

"Do you mean to say," asked the Installer's Helper, "that we should study sixteen hours a day? that's the worst I've heard so far."

"Certainly not," replied the President. "It is not necessarily what you do during those sixteen hours that secures promotion for you, but likewise what you don't do. I mention this to you younger men particularly as advice that sleep may be more beneficial to you than the habitual frequenting of pool rooms. However, if this is to be a discussion of telephone subjects rather than a sermon, I will relinquish my place and let the Wire Chief explain something of the fundamentals of electricity which are used in telephone practice."

"I am afraid," begin the Wire Chief, "that many students of the art of telephony become biased against terms which seem strange to them and particularly against any expression which savors of mathematics. The basic principles of electricity with which the telephone man comes in daily contact are no more complicated than are the basic principles of mechanics which the same student accepts without a question. It is true that no one has seen electricity and no one seems able to give an adequate definition of the term; but so far, I have heard no better explanation of gravity or of friction than I have of electricity. Neither of these has ever been seen and we recognize them only by their results as being forces of nature. Electricity and magnetism are very closely allied and the latter is always found in the presence of the former, but they are not identical and consequently two different sets of units are used in speaking of these forces. I will try to explain some of these units by comparing them to those units in mechanics with which you have become familiar through association.

"Scientists who named electrical units took a step farther than those who named the mechanical units and coined names whose equivalents do not exist in mechanics, so we may say that instead of complicating matters these scientists really simplified them materially by giving new names to the equivalents of combined names used in mechanics. The ohm, ampere, coulomb and volt, and many other electrical units are named in honor of scientists and early experimenters in the field of electricity.

"In mechanics we designate the opposition met with in moving or attempting to move an object as 'friction,' but no definite unit for this has been accepted generally. In electricity we term this opposition 'resistance.' Resistance is that property inherent to materials for opposing the flow of an electric current through them, and it varies in different materials very similarly to their property of conducting heat. That is, metals which conduct heat readily also conduct electricity readily and are called conductors, while non-metals possess greater resistance and are called non-conductors, insulators or dielectrics. Every metal offers some resistance to an electric current and no non-conductor or insulator is so perfect that it will not conduct some current. In commercial work copper is used to such a great extent for carrying electricity because of its low cost per current carrying capacity and the ease with which it can be manufactured into wires.

"Here is a table of materials used in telephone work showing their relative conducting property, as compared with pure silver which is taken as a standard:

Material .	*Relative Conductivity at 32° F.*
Pure silver	100.00%
Refined copper	99.9 %
Gold	86.65%
Aluminum	63.09%
Zinc	29.07%
Platinum	10.60%
German silver	7.89%
Graphite	.07%

"Among semi-conductors or bad insulators are classed the following: Water, aqueous solutions, wood, cotton, liquid acid and gases. Paraffine, silk, sealing wax, hard rubber, glass, mica, shellac and air are good insulators. The resistance of these last mentioned runs

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very high; for instance, the resistance of dry glass may be as high as 1,500,000,000 megohms per cubic inch."

"What is a megohm?" asked the Installer's Helper.

"A megohm equals one million ohms. So you see that glass is a very poor conductor. In electrical work the name 'ohm' has been given to the unit of resistance. It represents the resistance of a column of pure mercury, at 32 degrees Fahrenheit, 106.3 centimeters long (41.3

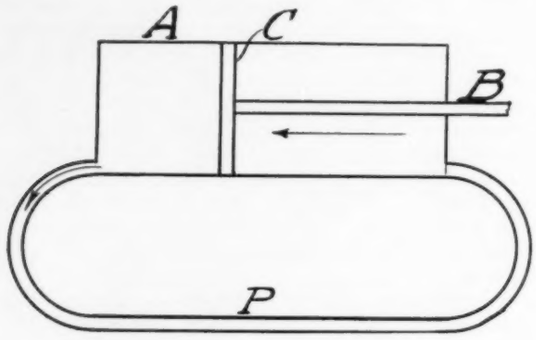


Fig. 47.

in.), weighing 14.45 grains and with a uniform cross section of one square millimeter. Roughly speaking, it is the resistance of about 600 feet of No. 12 wire or one foot of No. 40 wire, Brown and Sharpe gauge. The resistance of a wire in addition to varying according to the material of which the wire is made, varies also in accordance with its length and inversely with its cross section. That is, a wire twice as long as another will have twice its resistance and a wire having twice the cross section will have half its resistance. In measuring the cross-section of wires, the mil or .001 inch is usually taken as a basis and the area is given in circular mils. This is obtained by multiplying the square of the diameter of a wire in mils by .7854. The resistance of a conductor also varies according to its temperature, increasing as it becomes warmer. However, in our daily work we seldom need to consider this factor except in measuring for trouble on toll lines or in cables.

"To designate the quantity of current flowing through a wire the term 'ampere' has been adopted. Its equivalent in mechanics would be the number of gallons or cubic feet of water flowing in a stream per second. The unit in electricity equivalent to the gallon or cubic foot is called the coulomb, it being the quantity of electricity which under proper conditions will deposit .017253 grains of metallic silver from a solution of silver nitrate. In preference to saying that a current of one coulomb per second is flowing we simply state that a current of one ampere is flowing. An ampere, therefore, is that current which will cause the deposition of silver at the rate of .017253 grains per second. In a telephone circuit we do not require current in large quantities and the milliampere, which is one-thousandth of an ampere, is used instead of the ampere.

"If we had a system of pipes for conveying a flow of gas or water it would be impossible to transport anything through these pipes without pressure, and to convey intelligently the idea of how much pressure we had available for this work we would use the expression 'so many pounds per square inch.'

"The unit of electrical pressure is called the 'volt' and the nearest practical example of this unit that comes to my mind at present which is familiar to you is the voltage of the ordinary dry cell. Two new dry cells would give approximately three volts across the carbon of one cell to the zinc of the other cell if the other binding posts are connected. In ordinary practice we often speak of difference of potential, potential difference, electromotive force, voltage, or electrical pressure; meaning the same thing in all cases. Any electrical generator, whether it be a battery, a dynamo, or any other of the many sources of current, is simply an apparatus for converting chemical or mechanical energy into electrical energy by raising the pressure at one point and lowering it at another. On connecting these two points, a current will flow in an effort to equalize this difference, and if we wish anything more than a momentary impulse, it is necessary to expend energy continuously to maintain the difference of potential in spite of the equalizing current. We cannot generate electricity, but we can disturb the equilibrium of the charge already existing in all substances, and nature's effort to restore that equilibrium gives rise to a current. The primary battery, represented in our present work by the dry cell, and the dynamo—or generator, as it is more commonly called—form at present the only commercial means of setting up a more or less continuous difference of potential and in that way furnishing us with a current.

"At this point I wish to dwell briefly on the expression 'fall of potential.' If we set up a battery using a copper plate and a zinc plate and acidulated water and test the terminals with a voltmeter for difference of potential you will note a deflection of the meter. Now if we close the circuit through an ammeter, first inserting

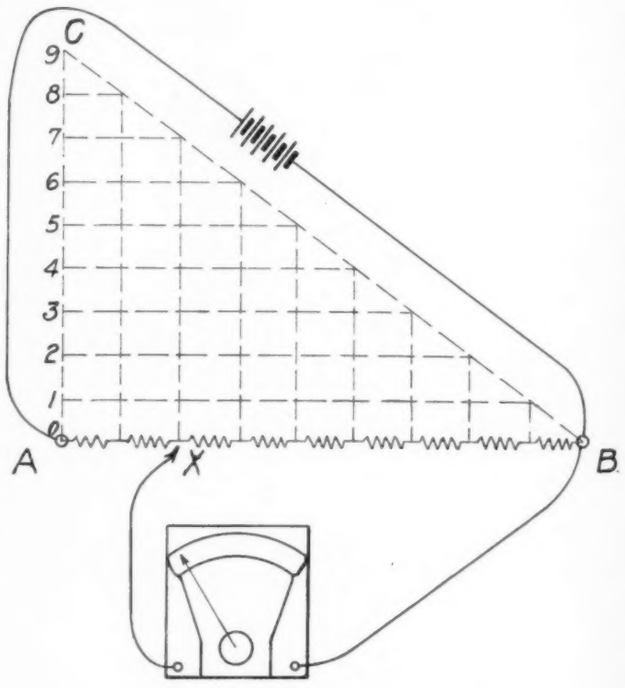


Fig. 48.

a small protecting resistance, we get a deflection and note that a chemical action has occurred in the battery as shown by the gas bubbles on the copper plate. As soon as we open the circuit this chemical action ceases. Very little chemical action was noted when the voltmeter was connected across the zinc and copper plates because

the resistance of the voltmeter is high and consequently little current flowed. If it is true that in setting up a difference in electrical pressure we merely disturb the equilibrium which ordinarily exists, then we must have raised the potential at one point and in so doing we must have lowered it elsewhere in the circuit. This may be illustrated in Fig. 47, in which *A* represents a cylinder having an opening at each end connected by the pipe *P*. The cylinder *A* is fitted with a piston *C*. Assume the cylinder to be full of water. If we exert a pressure in the direction of the arrow on the piston *C* by means of the rod *B* we create a positive potential ahead of the piston and a negative potential just behind it and a current flows through the pipe *P* which tends to equalize the difference in potential. If we set up several dry cells, say six, and connect them in series, zinc to carbon, zinc to carbon and so on, in order to get their added voltage, inserting resistance in the circuit, and then connect a voltmeter across the outside terminals of the battery we get a reading of nine volts. Now suppose we have one terminal of the meter connected to the battery and touch the other terminal of the meter to a point one-third the way along the resistance, we get a reading of three volts. If we move half way between this point and the other battery terminal we get a reading of six volts. That is, the fall of potential in a circuit is proportional to the resistance passed over. This may be illustrated graphically in this manner (Fig. 48). Draw a base line to represent the resistance and another perpendicular to it to represent the battery voltage. Divide the base line into, say, nine parts, and the perpendicular line into an equal number of parts representing the voltage and draw horizontals and verticals at the dividing points. The fall of potential between points *A* and *B* will be the full voltage of the battery, and the fall of potential through the resistance to any point will be indicated by the point at which the perpendicular and horizontal meet on the line *BC*.

"There is a definite relation between the current flowing through a conductor, the resistance of that conductor and the pressure at which the current flows, and this relation is always constant; that is, if the resistance of the conductor is one ohm and the pressure at which the current is flowing is one volt then one ampere of current will flow. The greater the resistance of the conductor the less current will flow. If the resistance remains constant and the pressure is increased, the current flow is increased correspondingly. This constant relation is often expressed as follows: Current equals electromotive force divided by resistance, or

$$\text{current} = \frac{\text{electromotive force}}{\text{resistance}} \quad \text{or} \quad \text{amperes} = \frac{\text{volts}}{\text{ohms}}$$

so that if you know any two of these three items it is easy to find the third. Using the letter I to represent the current or amperes, and E to represent the electromotive force or volts, and R to represent the resistance of ohms,

$$I = \frac{E}{R} \qquad E = I \times R \qquad R = \frac{E}{I}$$

These simple formulas are known as Ohm's law. There is no reason why you should fear them, for they call for nothing more than division or multiplication and they are the key to all electrical calculations. Take the ordinary 100 volt carbon lamp. This consumes one-half ampere of current. Consequently, to find its resistance when hot use the formula

$$R = \frac{E}{I}$$

and substitute the known factors

$$R = \frac{110}{\frac{1}{2}}$$

110 divided by ½ equals 110 multiplied by 2

$$R = 110 \times 2 = 220 \text{ ohms.}$$

"The ordinary receiver measures about 80 ohms. To determine how much current will flow through it in a simple twenty-four volt circuit, use the formula $I = \frac{E}{R}$.

$$I = \frac{24}{80} = .3 \text{ amperes or } 300 \text{ milliamperes.}$$

"There is one other unit with which we frequently come in contact in our work called the 'microfarad,' which is one millionth of a 'farad.' The farad is the unit of capacity. A condenser which has a capacity of one farad will hold one coulomb of electricity at a pressure of one volt, therefore a two microfarad condenser will hold two millionths of a coulomb of electricity at one volt pressure.

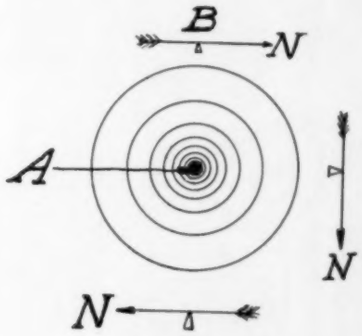


Fig. 49.

"When a circuit is closed which includes a source of electrical energy so that a current flows through the circuit, that circuit immediately becomes surrounded by a magnetic field, the magnetic lines of force arranging themselves in invisible concentric circles around the wire carrying the current. That this happens can easily be proved by inserting a wire through a sheet of paper and scattering iron filings on this paper and then tapping gently after the electrical circuit through the wire has been closed. The lines of force will arrange themselves as shown diagrammatically in Fig. 49. Assuming that the wire shown at *A* is carrying a current flowing away from the observer, these lines of force will be set up in a right hand or clockwise direction; and a magnetic needle brought within this magnetic field at *B* will point toward the right. The magnetic field of force will begin near the wire as soon as the circuit is closed and expand to its maximum after the current has reached its maximum. If this current is flowing in one direction only and does not vary the magnetic field will remain constant; that is, these invisible concentric circles will remain at rest. If, however, the current is interrupted or is varied or its direction changed, this field of force will expand and contract with the changes occurring in the electrical circuit. If a wire connected to a meter is brought within

the field of force so that a portion of its circuit is parallel to the wire *A* (Fig. 50) the lines of force caused by the current flowing through *A* will 'cut' the wire *B* and set up a current in that circuit as will be indicated by the meter. This current will flow in the wire *B* only as long as the magnetic lines of force are actually in motion so that if the current through wire *A* is constant in volume and direction this flow of current in wire *B* will be momentary. If, however, the current flowing through wire *A* is varied, interrupted, or its direction is changed,

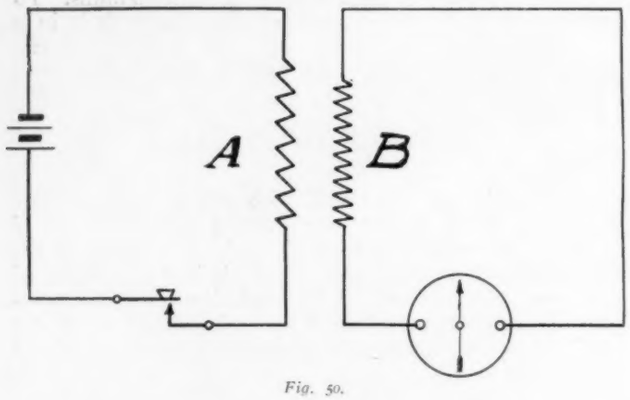


Fig. 50.

the corresponding changes in the magnetic field around *A* will affect the magnetic field around the wire and show changes in the flow of current through wire *B*. That is, the current in wire *B* will be an induced current athough there is no electrical or physical connection between the two wires. If the two wires *A* and *B* are wound parallel in a coil, the magnetic effect of one wire is augmented and if these two wires are wound on a soft iron core the effect is still further increased. This is the principle of the induction coil. The increased effect due to the addition of the soft iron core is caused by the peculiar property of soft iron in affording a path of less resistance to the magnetic lines of force than that afforded by air. Consequently the strength of the field of force is increased and a greater number of lines of force affect the secondary winding. Experiments tend to show that when iron or steel is magnetized their smallest possible physical divisions called molecules are put under a strain tending to place themselves in parallel lines to afford as little resistance to a magnetic flow as possible. In the case of soft iron these molecules apparently rearrange themselves to their former positions as soon as the magnetic influence is removed from the iron, but in the case of steel the molecules evidently remain in a more or less strained state and retain the property of magnetization. We would naturally expect that the softer the iron the easier the molecules could be turned in this way, and also the less their tendency would be to retain this strained position when the magnetizing force was removed. This is apparently the case, for soft iron can be magnetized much more readily and strongly than hard iron or steel; while it retains comparatively little, as contrasted with the 'residual' or 'permanent' magnetism found in hard iron or steel. There is a partial exception to this rule when the magnetic circuit consists wholly of iron. In that case the molecular magnets can complete their circuit as readily through the entire mass of iron as they can by resuming their normal positions. On opening the iron circuit they will, of course, fall back and form closed circuits among themselves. This is the explanation of the familiar "freezing" of a relay or ringer armature when the air gap is too small to form an effective break in the circuit.

"If in Fig. 50 the winding *B* has a greater number of turns than the winding *A* the voltage in the circuit *B* will be increased but the current flow will be decreased, and if the winding *B* has a less number of turns than the winding *A*, the voltage will be decreased and the current will be increased. The resistance of each of these circuits will affect the results but we will not dwell on this effect tonight. The induction coil depends upon exactly the same principles as the transformer in electric light and power work.

"The repeating coil is an induction coil in which the two windings usually have the same number of turns so that the voltage in one winding is the same as in the other. It is used to separate the battery supply of circuits which carry audible transmission such as, for instance, the A board cord circuit. It is also used to connect grounded lines to metallic lines. In such a case there will be no actual physical connection between lines but the conversation over one is repeated in the other. The changes in the magnetic field which are set up around each turn of a coil by the variations of current through that turn do not occur at exactly the same instant that the changes in current flow do; that is, there is a slight lag after the current has reached either its maximum or minimum and this delayed change in the magnetic field offers a resistance to rapid changes in the circuit so that in the design of coils this so-called property of self induction must be considered. A coil may be designed having

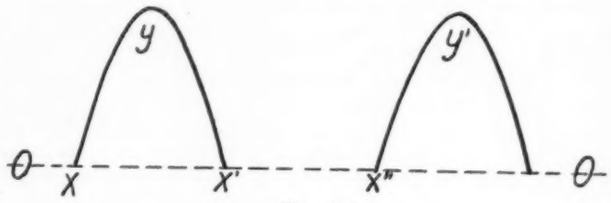


Fig. 51.

one winding which will offer a very high resistance (or, more correctly speaking, impedance) to a current which varies in any manner but which will offer very little resistance to a constant direct current. Such a coil is valuable in keeping out noises or cross-talk in common battery circuits. It is sometimes called a choke coil, retardation coil, retard coil, impedance coil, inductance coil or reactance coil."

"Wait just a moment," interrupted the Installer's Helper. "Please explain to me just what is the difference between a direct current and alternating current and any other kind we come in contact with."

"I expected that question to come sometime during the discussion and would have been disappointed had you failed to ask it. We refer to a direct current as one flowing in one direction only. If its voltage is not raised or lowered we call it a constant or continuous current and diagrammatically represent it by a straight line. If this current is interrupted it will require some time for the voltage to build from zero (no current flowing) to maximum, and it will drop again to zero when the circuit is broken. We indicate this diagrammatically by a base line representing zero potential and indicate the rise from zero to maximum by a curved line as shown in Fig. 51. The portion *XY* represents the rise in electrical pressure

or potential and the portion YX' represents the fall in potential back to zero. Then the portion $X'X''$ represents the time during which the circuit is broken. The time consumed in building from X to Y and returning to X' is called a period. This is on the assumption that the current is a direct current. In telephone work we obtain the direct

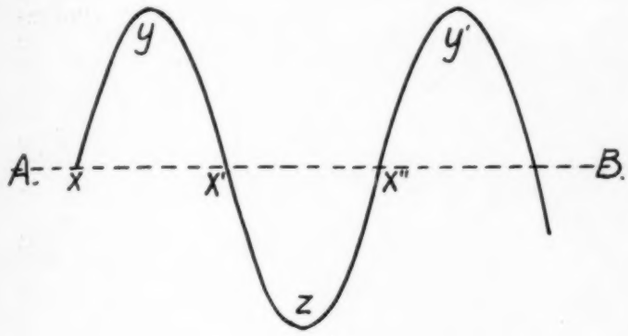


Fig. 52.

current from storage batteries which are charged by direct current generators. The current supplied by a dry cell or any other type of battery is also direct current.

"It has been found of commercial advantage to use an alternating current for transmitting power over great distances, so that practically all of our lighting circuits use alternating current. In alternating current the electrical pressure starts at zero and rises to a maximum, falls to zero, rises in the opposite direction to a maximum, falls to zero then rises to maximum in the first direction and so on. This is indicated diagrammatically in Fig. 52. The line AB represents the zero potential and the points Y, Y' represent the maximum potential in one direction while Z, Z' represent the maximum potential in the opposite direction. The time required for building up from X to Y and falling to X' is called an alternation of the current, while the time required to make a complete reversal in both directions (X to Y to X' to Z to X'') is called a cycle. If there are 120 alternations per second in the circuit, it is called a 60-cycle circuit."

"Is that the kind of current we use in ringing the subscriber's bell?" asked the Cable-Splicer's Helper.

"No," replied the Wire Chief, "that is not exactly the kind of current we use in ringing our bells, but it is, however, the kind that is used in ringing subscribers' stations in a great many systems. At some places an interrupted direct current is used. This is generated by accurately timed vibrators which permit the use of polarized bells tuned to the frequency of each vibrator so that three, four, or five parties may be connected on one line and but one bell rung at a time. This system of ringing is called the harmonic system. We do not use the harmonic system here but select one of four parties by another method, in which interrupted or pulsating currents of about twenty cycles are used."

"That is one point I wish to be instructed in," said the Cable-Splicer's Helper. "How do you pick one of the four parties on our lines? I have been at the cable poles and have seen that only two wires are used to connect the telephones to the exchange, but I don't see how one bell is rung without ringing all the others."

"That is not one point," replied the Wire Chief, "that is a whole evening's instruction. Have you any further questions relating to the subject we are discussing?"

"No, I will get that book you mentioned and see if I find any point not clear to me. Then I will come back at you at some other meeting."

"If we have no further questions a motion to adjourn is in order," announced the President. Motion carried.

(To be continued.)

North Dakota Telephone Men Meet at Grand Forks

The features of the opening sessions of the North Dakota Telephone Association, March 24-25, at Grand Forks, were the excellent address of Frank L. McVey in the morning on some phases of taxation in connection with the telephone industry, and that of Dr. A. Hoyt Taylor in the afternoon on radio communication.

Over one hundred telephone men were present.

The convention opened in the morning with an address of welcome to the city given by Mayor James A. Dinnie and which was responded to by C. H. Coar of Minot.

President D. L. Richardson of the association gave his annual address and made a number of valuable recommendations regarding the improvement that could be made in conduction of telephone companies. Discussion followed, after which the report of the publicity committee was made by C. H. Coar.

The afternoon meeting was addressed by Tracy R. Bangs and W. H. Stutsman, president of the North Dakota commission.

The convention closed with a banquet at the Commercial Club rooms and a theater party.

L. D. Richardson of Fargo was re-elected president of the association; W. H. Wilson of New Rockford, vice-president, and H. A. Livermore of Fargo, secretary-treasurer.

The forenoon was given over to addresses by A. F. Kelly of Omaha, general traffic superintendent of the Bell group, who told how to best operate an exchange and distribute the business in a manner that would be most efficient, and M. E. Young of Fargo, engineer for the North Dakota Independent Telephone Company, who discussed engineering work in small plants.

North Dakota Convention at Grand Forks.

Hiram D. Currier.

Operating Responsibility

Address Before the Independent Telephone Association of America

BY H. D. CURRIER

A TELEPHONE company operating under a franchise has a duty to perform reposed in it by the municipality granting the franchise. The acceptance of a franchise by the public utility company contemplates an obligation upon its part to give good and continued service. To give good service the plant must be properly designed, maintained and operated. To give continued service the company must be in first-class financial condition and remain so.

The rates for service stipulated in a franchise should contemplate sufficient revenue to pay earnings on the investment. The rates should further provide for replacement values and maintenance charges. If a company accepts rates which do not take care of these elements—and this has occurred in several instances in the past—it is usually because the relation of rates to depreciation and maintenance was not determined at the time the franchise was granted. The spirit which prompted the acceptance of low rates may have been a laudable one in so far that the applicants were endeavoring to furnish public service at a lesser amount than the exorbitant rates prevailing under the conditions of monopoly, but analysis has, in several cases, proven that the definition of rates was governed too much by pure commercial contemplation and the effect of time and wear were not given the necessary consideration. The existence of low rates and as a result the depletion of the plant, whereby the service and transmission suffer, does not make the operating man exempt from responsibility for good service. When such a condition is brought about, application can be made in most states to the public utility commission for authority to increase the rates, and this should be done. The excuses used in applying to commissions for increased rates are usually backed up by elaborate compilations relating to the commercial phases of the business, and the applicant depends only upon these explanations for favorable action. How much more effective these applications would be if in addition to the commercial analysis a thorough technical definition of plant efficiency was attached to the application, thus showing the necessity of increased rates. The operating responsibility of the executive heads of a telephone company, it seems, should require that they furnish this information to commissions and enhance the probability of having the request for increased rates granted, with the result that the plant may be placed in a healthy physical condition permitting of better service.

It is only a short time, comparatively speaking, that telephone men have had the opportunity to enter the business, and the incentive which prompted the applications for franchises in the past was one whereby it was desired to overcome the effects of monopoly. The greatest activities were exerted in organizing and financing. The minds of the men making application for franchises were occupied in overcoming the barriers placed in their way. The raising of sufficient money to build a plant was the paramount thought, and in several cases the individuals endeavoring to obtain franchises and serve the public had very little telephone experience. Furthermore, information relative to plant layout and efficient design was not obtainable.

We have all been in the telephone business long enough to realize that the consideration of these subjects is of just as much importance as the financial contemplations, and operating responsibility closely defines that it is incumbent upon the executive head of a telephone company to personally consider or delegate some one to consider these subjects. By the process of organization, finance and technique may be blended, thereby arriving at the answer of an efficient plant. Public utility commissions are the legally appointed referees between the public utility company and the public it serves. Rules of procedure are sent out to telephone companies and most of them have an expert staff busy compiling information for the commissions.

Did any of you ever consider the nucleus around which the activities of the state commissions are centered? Read any trade journal which prints the proceedings of these commissions, and you will find their decisions have a quasi legal sound regarding involved subjects of inter-relation of connecting companies, rates, questions of public conveniences and all the other arguments incidental to a dollar. The things the public is concerned in, such as standards of transmission, speed and accuracy of service, with the proper way to proceed to obtain these results, we seldom read about.

The business man finding himself at the head of a company which has weathered the storm of the turbulent days and who has devoted years of endeavor to guide it financially to success, can find plenty of people to tell him how to handle the financial end of his business, but very few sources of information exist where it is possible for him to obtain authentic and useful information relative to the technical considerations of his plant so that he can use this information intelligently in financing his property. The man to whom he sells service knows nothing of this condition. That individual, however, holds him responsible for service and morally he is responsible. Proper design and operation form the foundation upon which healthy finance must exist.

The operating man should have available necessary information to put his plant in order with the least expenditure of money. The subject of operating is involved. Scheduling of operators with an intelligent understanding of maximum load values will result in more saving than anything connected with a telephone organization, providing that where this is done the money saved is not thrown away in some other part of the plant. There are well defined rules relating to this subject which when put into effect will in several cases, as past analysis has proven, more than equal the interest on the inside plant investment and will con-

tribute largely to its annual maintenance charge. In most instances operating men will refer you to the wire chief, construction foreman or plant superintendent, when a question comes up relative to the plant, and it is true that perfect organization would result in the proper answer being obtained, but the wire chief or plant superintendent has not had the necessary training in commercial practice to know exactly how his decision will affect the finances of the company. This is no reflection upon the wire chiefs and plant superintendents—it is not their job to be versed in all of the refinements of such a rapidly growing art as telephony. We might say that it is not the job of the financial man to burden his mind with sufficient technical details to give an intelligent answer on these subjects, but it certainly is reasonable that there should be some source of information that will blend the technical and commercial considerations into a proper action.

Efficiency engineering is applied to all branches of industry today with excellent results, and to my mind it seems wrong that the services of an efficiency engineer can be obtained to find the weak places in manufacturing plants, clerical systems, street railway operation, electric light service, steam railroads, and in fact any other branch of business that you may suggest, yet how few men of this character there are in the telephone business and how little are their services sought. It seems strange that the telephone organizations of this country, representing the telephone industry as a whole, have not taken some action to help executive heads of telephone companies by placing before them information of technical nature. The independent telephone industry must at some time in the future have some central point from which will emanate rules of practice.

The art of telephony in the last fifteen years has been undergoing several changes in design of central office equipment, but the fundamental principles underlying—transmission, for example—are well defined, and it is possible today to stipulate the percentage efficiency required in a plant for transmission purposes.

Unit load values in traffic are worked out and the scheduling of operators can follow a well defined scheme resulting in the greatest economy. Unit costs per station to operate a plant have been determined and in an analysis of several plants made in the last year, the wide variance of costs per station to operate can only be explained in the fact that principles of economy are not universally understood.

The operating telephone man is not particularly interested in the specific construction of apparatus, but he should be held responsible as to whether he purchases apparatus of a low or a high grade of efficiency. It is possible to determine the percentages of efficiency in repeating coils, receivers and transmitters. The minimum current values to be delivered to substations in common battery work, with resultant proper transmission, are easily determined. The proper size cable conductors for given loop distances and the proper specifications for mutual capacity of cable conductors, are well known. In the past the operating man has depended upon the manufacturer for all of these things. It seems proper that the operating man, the one who buys and must use equipment, should be the one to stipulate the degree of efficiency that should exist in the apparatus purchased. This thought is equally true with operating methods. It seems that the operating man should not depend too much upon the manufacturer in this regard.

If it is necessary that there should be a meeting on common ground between the commercial and technical men of an operating telephone company, it is equally necessary that there be some point of meeting between the operating man and the manufacturer. This can be accomplished in only one way. A standardization committee must be appointed. This standardization committee must be maintained by the telephone organization. It is not fair to ask one operating company to pay the expenses of a man who might be appointed on such a committee to do work for all the other units. It is not suggested that the members of the standardization committee devote their time solely to that work, but it seems reasonable that a standardization committee of representative engineers and finance men, who are fully as important as the engineers, could be organized. The expenses during the time they are devoting their endeavors to this standardization work could be borne by the telephone organizations. The prorated amounts necessary to cover the expense of these investigations could be assessed against the telephone companies who are members of the organizations in proportion to the number of substations operated in their plants. The costs spread over all of the operating companies would reduce the individual burden to a minimum, and the tabulated data which could be obtained from this committee would be of inestimable value to every company.

In telephony, the same as in other new industries, a certain length of time necessarily had to elapse before fundamentals of economic operation and efficiency of plant could be established and obsolescence is not to be considered until something better than existent practice is proven. One way to determine the question of obsolescence is careful investigation by a committee appointed for that purpose.

A standardization committee in six months time can have sufficient information available to guide any telephone company, no matter what its size, along economic and efficient lines. To illustrate some of the inconsistencies of the business, I recall several instances where large investments have been made in toll line construction between points, which resulted in better transmission than was possible over old lines. Larger conductors were specified and used. An intelligent analysis of the problem would have shown that had the terminal equipment been properly designed, the investment in the toll line construction could have been delayed for several years. When we cannot talk between two places, we blame the line, and in most cases the line has nothing to do with it. To the commercial mind it probably seems reasonable that when poor transmission exists between two cities the medium extending from one city to the other is where the fault lies and the several technical contemplations in connection with the terminal equipment are too involved for the commercial mind to take time to analyze. A new line is built, better talk results, and the presumption is that the correct thing was done, but no matter what the unit of conductivity may be in a line, transmission cannot be obtained without proper battery supply to the substation and proper efficiency existing in the equipment through which the telephone current is propagated before it reaches the line.

Chief operators are not traffic experts, wire chiefs are not employed as expert engineers, and it is just as reasonable that the commercial man should appeal to a chief clerk to outline for him some scheme of financing

as to appeal to a wire chief or chief operator and ask for a definition as to the correct procedure of rehabilitation.

A study made in the past year of several telephone properties has shown that an average of one dollar per year per station can be made by proper scheduling of operators and intelligent distribution of load. In multi-office districts operating economies are possible which never were considered before. The only way that this information can be placed before the executive heads of telephone companies in the proper light is to not use one man's opinion, but to take the verdict of several men skilled in their business and then apply the principles.

The telephone is a public convenience today, and was a toy at its inception. The daily routine of the public and the systems of commercial relation of people has placed the telephone upon the plane of a necessity. It is a public necessity, and the man who takes the job to operate that public necessity assumes an operating responsibility that includes the contemplation of the various subjects mentioned above. It seems that it is incumbent upon him to take the necessary steps to render the best service possible, and a good way to start is with a standardization committee. The substantialness of the telephone business as proven today should not cause him to hesitate to go at this problem methodically. We are each day becoming more dependent upon each other, and when we put forth a collective effort to work out the answer of service and efficiency, all telephone companies will be better off.

It is easy to explain the reason for the chaos existent in central office practices today. Manufacturers are competitors—operating men are collaborators. The operating units throughout the United States are working together to a common end. That being the case, they should work to a common definition of efficiency. Let the manufacturer compete, but let it be a question of quality. Do not force him into the position where he will be continually endeavoring to develop something different but not better in order to meet his competitor.

A standardization committee need not stipulate specific methods of handling traffic or specific design in equipment. The only thing that it need determine is the proper unit cost per station, which takes into account all expenses of plant for operation and fix a specification of efficiency that every piece of apparatus must pass. The subscriber talking into a telephone is not interested in the way his connection is established or the specific design of the equipment involved in the transmission elements of the circuits. All he asks for is quick and accurate connection and to be able to talk to the maximum degree of efficiency when connection is once established.

The manufacturer will continue to work and advance the art. Refinement in design can continue to emanate from the manufacturer, but any piece of equipment which is pleasing to the eyes does not necessarily have embodied in its makeup the proper degree of efficiency. I think you will find that manufacturers are only too willing to aid a standardization committee in arriving at the proper values of efficiency.

Insurance companies have their Underwriters' Association, and the underwriters have their laboratories. Manufacturers in electric light equipment must build to specifications which conform with the demands of the underwriters. It is equally true that telephone manufacturers should build to specifications which conform with the demands of a standardization committee representing the telephone industry as a whole. When this is done, the manufacturer will help to assume the so-called operating responsibility, and not until then will uniform efficiency and economy be possible in all plants.

It is suggested that the members of the standardization committee consist of operating men only. This is an operating problem and it seems it should be handled by operating men. This committee should be empowered by the association to study the plant of any company which is a member of this association and place the report at the disposal of the telephone company investigated.

Operating responsibility requires an intelligent analysis of the plant, and a standardization committee free to act can help to guide not only the operating company, but the manufacturer.

[Editor's Note:—The Standardization Committee appointed in accordance with the suggestion of this paper has already held its first meeting, which, with the personnel of the committee, was reported on page 158 of our April number. Further announcements of its work will continue to appear from time to time.]

Providence Reduces Rates

Reduced telephone rates for Providence have been voluntarily put into effect by the Providence Telephone Company.

Just what the amount of money involved in the transaction will be is something the officials of the telephone company are not yet prepared to state, but the joint special committee of the City Council on telephone franchise, which went into the matter, recently estimated that it would represent a saving to users of the service of more than $60,000 yearly.

The new and old rates are as follows: Measured service, 600 five-minute messages yearly, one-party, was $40, now $36, and two-party, was $33, now $30, for business telephones. The residence rates follow: One-party, was $30, now $27; two-party, was $25, now $22.20, and six-party, was $25, now $22.20.

On unlimited service the residence telephones are the only ones affected, the rates being: One-party, was $48, now $39; two-party, was $36, now $33; four-party, was $36, now $33. The six and four-party lines are for stations outside the city limits or more than two miles from the exchange, and additional mileage charge is made.

Business extension sets are reduced from $9 to $6, while receiving stations with line for inward service only are reduced from $30 to $24.

Canada Cuts Employes Salaries

The Manitoba Government Telephone Company has served notice on the employes of several departments that they would be docked so many working hours each day. The reason given for the decrease in the employes' stipends was that there was not sufficient work to keep them all going on full hours.

The classes of men affected by the order are the linemen, rackmen and installers. Much dissatisfaction has been caused among the men on account of the order. They state that there is more work at the present time than there was during the winter and also claim that the men in the other branches of the company should be docked an equal percentage.

By-Products of Telephone Operating

A Few "Side Lines" that a Telephone Company May Use to Advantage

BY GARRISON BABCOCK

THE successful enterprise is not always sustained and made profitable through direct issues. For instance, when we buy a newspaper for one cent, it does not realize a profit to the publisher through the return to him of the cent, but your purchase of it helps to make up the circulation, and the price which the publisher may successfully charge for the advertising columns is directly proportional to the circulation and the class of readers.

It is surprising how many industries figure their profits from the volume of by-products. It is the sign of thrift. The great fortunes of Rockefellers, Armours, Hills and Harrimans were principally secured through their keen foresight surrounding the by-products of their enterprises.

TELEPHONE ADVERTISING.

The sign of industry which one sees when entering a street car, or when passing a vacant lot, having a string of attractive advertisements, seldom fails to impress the thought that somewhere behind the scenes there is a head which is alert to claim every channel of profit. Even when passing by a cemetery one is sometimes impressed with the fact that certain of the inhabitants were possessed with ability, or left relatives who set forth unmistakable signs of profitable advertising. Signs of prolificacy and longevity constitute an asset worth advertising even in a cemetery to proclaim family distinction.

Advertising undoubtedly had its inception as a tomb maker and from that primitive step to moving pictures of today represents the efforts of workers in the advertising art.

The telephone directory is one of the best advertising mediums in existence, but unfortunately the advertising agencies rather than the operating company are making the large directory profits.

Collectors and contract solicitors who are encouraged to work up advertising for the directory could greatly increase their earnings by taking a correspondence course in advertising and "ad writing," and it would not be long before the telephone directory would be issued in monthly editions to the great benefit of the service and profit as an advertising medium.

A separate classified directory issued quarterly, can be devoted almost wholly to advertising space and still retained on the directory "peg" if its cover is of artistic appearance.

Quick reference lists and devices, as well as memorandum brackets with neat advertisements, can be made useful to subscribers, and profitable.

I recall a vivid incident connected with my operating experience when I attempted to adapt, with the phonograph busy signal which we were operating, interposed sentences reminding the calling party of local wares. Twenty-four hours of this innovation proved very interesting to most of the subscribers who discovered its existence, for I found the circuit overloaded with curiosity seekers who were displeased when advised that others were calling for their line.

The end came from an unexpected source, when a certain lawyer of the town, who was known to the telephone company as a "chronic kicker," after calling for his home, was connected to the phonograph. The machine advised him that "the line is busy" and inquired, "Do you trade at Burrows' Drug Store?" To this he made several replies and remarks before calling for the manager, and failing to get satisfaction over the telephone, made a hasty call on that official, which happened to be the writer. It was an interesting interview, but only the removal of the offending "advertising cylinder" saved the company its subscriber. However, it proved the making of a good friend, for after the saving sense of humor arrived this subscriber became much interested in the telephone enterprise and was made a director at the next annual meeting.

PRIVATE TELEPHONE AND TELEGRAPH LINES.

In nearly every community there are certain firms or individauls who have use for private means of communication. A development of these requirements oftimes relieves the traffic of expense and provides a profit besides. The use of intercommunicating systems frequently creates a demand for more central office trunks.

Composite circuit capacity, where it is not used for commercial business, can be leased for private line use and offers an element of almost clear profit.

For telegraph purposes these composite circuits are sometimes built up through several connecting companies' lines with equal success, but of course the element of maintenance is a more complex one if the lines are not maintained to a high standard.

PROTECTIVE SERVICE.

The field of private and municipal fire alarms is a growing one, which is being forced through ordinances intended to increase public safety and to reduce the growing ratio of annual losses from fires.

Insurance rates are sometimes lowered by the installation of fire alarms to an amount covering the entire cost in from one to five years.

The local operating company is most favorably situated to contract for this class of service, owing to its facilities of both lines and skilled help.

In this connection the supply of police telephone systems and burglar alarms as well as watchman registers comprise a field for profit which can be readily ascertained by correspondence with the manufacturers, who will gladly cooperate with anyone who offers a prospect for the introduction of their goods. They will supply you with a classified list of eligible users, testimonials, useful when soliciting business, and samples for demonstrating purposes.

Minnesota Taxes Reach Maximum

Gross earnings taxes to be paid by telephone companies of Minnesota will reach $250,000 this year. This figure is the highest return to be paid by telephone companies in the history of the state. Seven hundred companies have paid their taxes.

European Telephone Development

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

THE question of the best type of telephone service for fairly heavy traffic was studied for some time at the Hamburg exchange, where conditions are such that the population and number of telephone connections is ever on the increase and requires, therefore, careful study in order to keep up with the general advance. For further extension of the service there are three types of service that come into question: the Hamburg distribution service, the American A-B-service, and the semi- or full automatic service. The advantages and disadvantages of the semi-automatic and automatic service have been discussed to a great extent in recent telephone literature, but the comparison between manual systems has not been discussed so much. The present article will therefore compare the manual systems on the basis of practical operating results at Hamburg.

1. Equipment and Operation of Hamburg System:— All of the telephone lines of the Hamburg system are at present concentrated at one central exchange. The exchange embraces three divisions serving for local traffic: the A-switchboards, in which the calls of the subscribers are received; the B-switchboards, in which the calls are answered; the C-switchboards, which are subdivided into six groups for 10,000 connections each, where the desired connections are made. Every telephone line is first connected to the 21 trunk jacks at the 21 C-switchboards of their group, so that the C-operators can reach any wire at any of the switchboards of the group. The wires then pass over to the A-switchboards, where they end in an answering jack with call lamp.

Every A-switchboard has in its vertical panels the call lamps and answering jacks for 800 telephone lines, and also on the table in front of the operator 90 plugs, with 90 supervisory lamps. The plug cords are connected with their wires to call lamps and answering keys at 90 different B-switchboard positions. These plugs with their wires may be used only when the supervisory lamp showing an open wire lights up, and it lights up only when the B-operator's wire corresponding to the lamp has no actual busy call. If a subscriber lifts his receiver, and his call lamp lights up at the A-board, the A-operator takes one of the 90 cord plugs, whose free-call lamp is lighted, and plugs the answering jack of the subscriber in question. The subscriber's call lamp at the A-board goes out and instead the call lamp of the line in use lights up at the B-board.

The B-switchboards, which are built in the form of tables, have each 30 or 40 call lamps and answering keys for trunk lines. For every group of the C-boards the B-board has 20 trunk line keys with free-wire call lamps. The free-wire lamps light up when the C-operator to which the trunk line leads is not busy with answering a call over the wires. The distributing wires do not stop at the B-switchboards, but go on further to multiple connected jacks in all of the groups of the C-board, so that the C-operators of any group can connect to any distributing wire desired.

If a call comes to the B-switchboard, and the call lamp of a distributing wire lights up, the B-operator presses the answering key of the calling line, and finds out to what group the call is to be connected. Then the operator connects to the trunk line at any free C-board, pressing down on the trunk key of a lamp which shows that the line is open for traffic, and informs the C-operator of the number wanted. The C-operator repeats the number, plugs the answering plug of a pair of cords not in use into the distributing line jack, extinguishes the call lamp in doing so, and goes on with the routine of all calls.

The above description shows that the calls from the A-boards pass on to free B-operators and from them to free C-operators. This peculiarity has given to this system the name of distributing service, and the lines passing from the A-boards by way of the B-boards to the C-operators are called distributing lines.

In order to be able to utilize the efficiency of the B-operators as much as possible, the B-switchboards were subdivided immediately after starting service into two main boards, which appear independent of each other at the A-exchange section. Every section has 15 or 20 distributing lines, and each of these two halves can receive calls from the A-switchboards. As long as the B-operator is busy with the answer of a call, and passing the same on to C, a call that might be waiting at the second half of the B-board will have to wait its turn. As this time rarely takes more than 6 seconds, no disadvantage has arisen from subdividing the B-boards. The time at Hamburg telephone exchanges is not extraordinarily short, but is satisfactory on the whole.

The C-switchboards are similar in their external looks to the multiple switchboards of any common battery system. In the vertical switchpanel they have, beneath the multiple jacks, which are used for the distributing lines, where most switchboards have the call lamps and the answering jacks, a smaller multiple jack panel for the distributing lines coming from the A- and B-switchboards. If the C-operator receives a number of a distributing line, she plugs the same number jacks in the lower (answering) multiple panel, and announces her presence with "Here, group three," etc., receives the desired number and makes the connection. The operation by the C-operator corresponds, therefore, almost entirely to that of a distributing operator in an ordinary multiple service exchange, though there are a few details that give the Hamburg operation a certain superiority in one sense, and more trouble in another sense.

(a) The Hamburg C-operator cannot select her answering cord, as can the ordinary multiple board operator, so as to use the cord nearest to the jack of the calling subscriber, and thus avoid the crossing of other cords, but she has the answering plug in her hand before the call is received and plugs any jack, regardless of crossing of cords. As the answering field covers more than two operators' places, however, the crossing of cords is unavoidable, with resulting exercise of greater care in disconnecting and greater possible errors of cutting off persons that are then talking.

(b) As soon as the operator in the ordinary multiple exchange has plugged the answering jack at her place she really has a call on her line; the C-operator at times answers by plugging a jack without really getting a call. She is then, to all appearances, busy with a call, while in reality there is no call over her wires. Such

false calls occur when the B-operator does not give the number clearly, or the C-operator does not get the number right and makes the wrong connection. This useless work on the part of the two operators reduces the efficiency of the C-operator materially.

(c) Add to this that not every trunk line call for making a connection goes at once to the C-operator. If, for example, two B-operators try to obtain a connection simultaneously from the same C-operator, and each finding the C-wire busy, desists at the same time, the C-operator receives a trunk line call for her services, but does not make an actual subscriber's connection.

(d) In addition, there is lacking, in the Hamburg exchange, an influence which often increases the efficiency of the operator in the ordinary multiple exchange, and that is the synchronism of many calls. The Hamburg C-operator receives one call after another. She never works under pressure and therefore works naturally slower than the ordinary operator, who has to work fast at times, and therefore soon "gets the habit" of working fast at all times.

All these things show that on the average there are fewer calls made per unit of time than is usually done at large city exchanges. If we place the average time limit of a connection at the ordinary multiple exchange, inclusive of waiting time, equal to 1 (hourly capacity equal 230 connections), with counting of calls equal to 1.05, we would have to call the service at the Hamburg exchanges equal to 1.2, equivalent to 190 connections per hour. To these 1.2 units must be added the average working time at the B-places with 0.6, and at the A-switchboards with 0.25 units, so that for a complete connection the Hamburg exchange would require 2.05 units. This capacity is about 5 per cent higher than of the American A-B-service taken per call; the number of operators needed is, however, higher for the Hamburg system of operation. This disadvantage is offset again by the possible use to be made of the operators during time of low traffic at the Hamburg exchanges.

There is one great advantage to the Hamburg traffic system, however, and that is its absolute safety and trustworthiness. The lower capacity for connecting calls and the greater safety are in direct connection with the lower speed and lack of pressure on the operators. Just because the operators at the C-boards need not work under pressure, but are always evenly worked, we have less of a strain on them, and consequently fewer wrong calls. There is one more factor that aids materially in their greater trustworthiness, which has nothing to do with the operating system itself, however. The operators are never employed at the switchboards for more than 2½ hours, at the most 3 hours, at a stretch, when they are relieved for ½-hour rest period. This policy was installed after detailed tests had shown that the number of wrong connections made by an operator increased after she had been working for more than three hours at a stretch. If the girls are given a half hour for rest, they regain their old surety again. As the fatigue error would be the same for any system, this factor will be left out of the discussion.

2. American A-B-Service:—In other large city telephone systems the subscribers' calls are usually received at A-switchboards without distributing multiple fields. The A-operator gives the group connection to the trunk line of a free B-operator, receives the number of the free jack to be plugged and connects the multiple jack of this line with the answering jack of the calling subscriber. The B-operator takes the plug of the line selected by her, tests and connects.

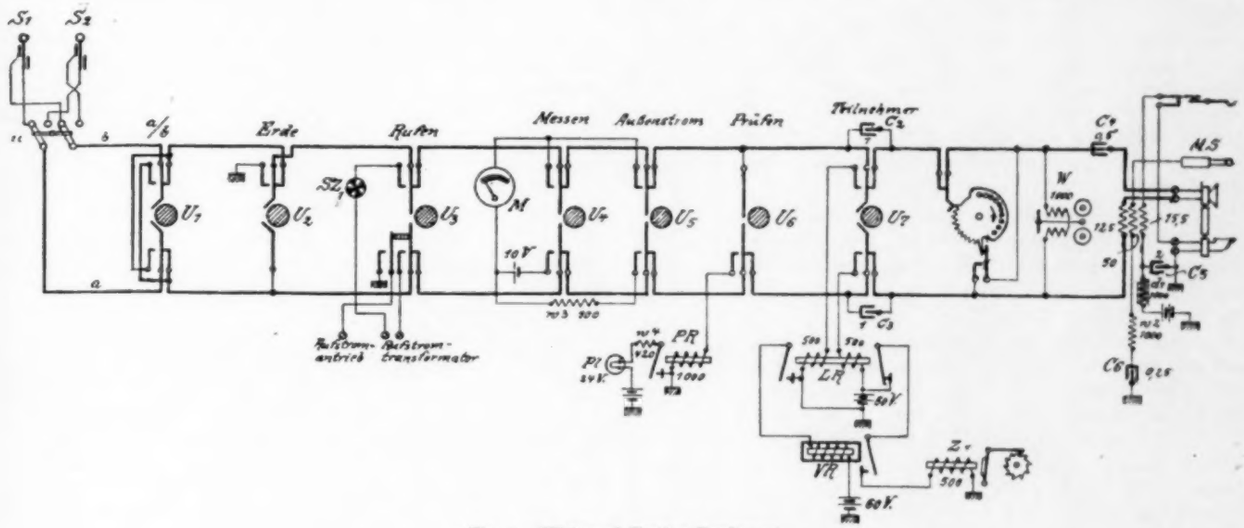


Fig. 1. Wiring of Testing Equipment.

The working time of an A-operator is said to be 1.5 time units (not counting in the time of conversation), with time of talking 1.55, and that of the B-operator with 0.4 units of the actual time taken to make the physical connections. The total would therefore be only 1.9 or 1.95 units as against the 2.05 units of the Hamburg system.

3. Advantages of the Hamburg System:—The American A-B-service gives the exchange and local number to the A-operator, who, in her turn, gives the same to the B-operator. This system would possibly give rise to several errors: *(a)* Wrong connections to a wrong exchange, if the B-operator did not catch the name of the exchange right or if she used the wrong trunk by mistake. *(b)* Possible wrong connection when making the connection at the B-board, since the B-operator may either remember a wrong number, or else make the wrong connection, as in addition to remembering the desired number, she must first inform the A-operator as to the

trunk line number which the latter is to use. As a result the error in such systems is about 3 per cent greater than in the Hamburg exchange. To this might be added the haste with which the A-operators sometimes have to work during heavy traffic conditions, especially when there are a number of calls coming in at one time and the subscribers get impatient and cranky, as unfortunately, is the case only too often.

In order to study the influence of working under pressure, the Hamburg telephone management had tests made, having C-operators work under pressure at certain times. Under these conditions these operators made on the average 276 connections per hour against the usual 190 under ordinary conditions. The time of connection was equal to 0.75. The operators were under observation throughout the whole time of the tests. It was shown that the operator pays the less attention to the progress of a call and its satisfactory nature in proportion as the number of calls per hour increases. The operators merely made and disconnected connections and did not watch over the various calls in proportion as their speed and pressure increased. Those connections that pass over the numerous private switchboards of the subscribers cannot be watched over properly by the supervisory lamps alone, due mainly to the carelessness of the subscribers themselves, so that it is often necessary for the operator to find out whether the call is finished or not and ask to disconnect.

4. Sensitiveness of the Hamburg System:—Now, if the Hamburg system is so safe, the question is natural, why is it not used more often than the American system? How is it that the Hamburg system has proved unsatisfactory at other places?

In order that the Hamburg system—and any other system, for that matter—work satisfactorily, we must fulfill one prerequisite: In the A-exchange there must always be enough plug cords for the incoming calls leading to B-boards, so that all traffic conditions may be met. Unless that is the case, several A-operators will grasp plugs at the same time that lead to the same B-boards. Then they receive the double busy-signal and drop their plugs again. The A-operators do useless work and the B-boards receive no calls. This demand that the A-operators always have enough free plugs for efficient service can be met only if the B-operators can pass on all calls smoothly without interruption. If there is trouble on a larger scale, and the calls to the trouble spot heap up, the free call lamps at the A-boards cannot light up, and in very unusual cases this might demoralize the whole system. Faults in the trunk system that can render entire switchboards useless are the worst to deal with. For that reason a distributing exchange needs, more than any other, carefully trained, skilled repairmen, who can remedy trouble as soon as it appears in any part of the system. Here is the danger. If an exchange is reconstructed according to the distributing system and if the repair department is not experienced enough in its work, the danger of poor service is worse than in any other system. But even when there is no trouble the system will not give the best satisfaction unless the operators themselves do their work conscientiously without being urged on especially. In Hamburg this demand could be met without trouble, and this will be true in most northern large cities, where the climate and general training are conducive towards good, efficient, painstaking service, and where the telephone companies may have their pick of the best possible material for carrying out this work.

5. Changes Proposed for the Hamburg System:—If the work of the C-operators is to be reduced, a part of the work falling on their shoulders will have to be transferred to the B-operators. To this work we must count all those processes that are not connected with the connecting and disconnecting of the connecting plugs, which action must remain at the C-board. The reduction of work can either be restricted to relieving the C-operators of the answering plugs and the distributing jacks, leaving the rest of the system as it is (supervision and counting of calls remain at the C-boards), or else the supervising of calls can also be transferred to the B-operators. Of course, the B-switchboards will be changed to do work taken from the C-operators.

A. American A-B-System with Distributing System Added:—If the supervision of connections in the Hamburg exchange is to be transferred to the B-places, the switchboards of the B-operators will have to be replaced by boards with multiple panels and plug table. The distributing lines coming from A would end in these new B-boards in a connecting plug with a call lamp, an answering key and two supervising lamps. The vertical switchboard panel must contain the multiple jacks for the outgoing trunk call lines which lead to the wires of the C-boards. There must be sufficient lines for the groups of each system. Aside from the jacks and plugs with attachments, each B-board receives for each group of the C-boards three trunk keys. If a call lamp lights up at the B-place, the B-operator presses down the answering key, as is done now, but asks not only for the group but also the local number. Then she connects to the trunk to a C-place of the desired group, and gives this number to the C-operator. The latter repeats the number, takes up the plug of the line and connects exactly as is done in the American system. The difference lies in this, however, that the A-boards are connected to distributing frames and that the answering places need only one cord for each connection. There are no practical operating results at hand for this new type of system. It is estimated that a B-operator can make 230 calls per hour. She will probably have to use 1.0 working time units per call. If we add the time of the distributing operator with 0.25, and that of the connecting operator with 0.4, we would have a total of 1.65 units for each connection. If this system should work out in practice, we would be able to obtain a considerable improvement in operation.

B. Distributing System, Using Selectors to Transfer Calls From B- to C-Boards:—The elimination of the table-shaped B-places can be avoided, if supervision is left to the C-places and they are relieved only of the connecting and disconnecting of the answering plugs. In this case also the distributing lines coming from A must end in B, and the lines to the distributing plugs must lead to the B-boards. The B-boards must, in addition, be supplied with selectors, which connect the distributing lines with the subscribers' wires to the C-switchboards. The operation is given in brief form: The B-department is subdivided into 6 sections. The B-boards of each section are given for passing on the calls in each group 9 C-boards with each 20 connecting cords; in the case of 8 groups we would there have 1,440 ways of connecting. These 1,440 connecting possibilities are connected at each B-board of the same section to the contact sets of 36 forty-division selectors. Each forty-division selector receives 5 connecting wires to each of the eight groups. If a call is to be passed to the C-operators with the aid of these selectors, only a selector can be used having no connection and having a free plug

at one of the contact sets which can reach a free C-operator of the desired group. Such a free connecting selector the B-operator will have to seek with the aid of a pre-selector. Each B-operator has two pre-selectors for each group, one of them belonging to the distributing lines of the one half, the other to the distributing lines of the other half of the board. The B-operator, after receiving the call, presses down the proper pre-selector, which latter selects a connecting line selector which can be used to make the connection. The C-wire is now busy for other incoming calls and the connection can be made.

The fingers of the connecting selector at the B-board are now connected with the connecting plug of a free C-operator, but as yet not with the A-line from the A-board. In order to make this connection, the fingers of the connecting selector are directly connected to the arms of another 40-part selector, and at the contact set of this call-line-selector are the 40 distributing lines that are to be served by the B-operator. The fingers of the call line selector run synchronously with the fingers of the selector and stop at that contact at which the line to be connected has stopped. As the fingers of each of the 36 selectors of a B-place are connected with the fingers of a definite call selector, each B-place has 36 complete connecting units, which correspond in their effect to 36 pairs of cords in the ordinary system. The call selectors work like answering plugs, the selector fingers like connecting plugs. They have that advantage, however, that they return automatically to their rest position after the call is finished. Operation is as follows: After the call comes in at the B-board, the answering key is pressed down as usual, and the number received. Then the B-operator presses down the group key desired, whereby the group pre-selector and a free selector connecting link unit connects the distributing line from the A-board with a free cord at the C-board. If the selectors have made this connection, the call lamp at the B-board goes out and instead a call lamp lights up at that connecting plug in the C-board, upon which the call has been switched. The C-operator answers, tests and connects. Supervision and registration of call are at the C-board. When the C-operator disconnects, the selector arms return to their original position.

The advantage of this system would lie in the fact that the Hamburg system could be decentralized when necessary. If this were attempted under the present system, all of the distributing lines would have to be connected to this new exchange. As this is out of the question for financial reasons, Hamburg is tied down to the centralized system. If, however, the lines from the A-boards were to end in the B-boards, and were connected further by cord plugs or selectors, connecting cords could be placed for service not only at the C-boards at the central exchange, but at any other exchange. All of the exchanges could then be equipped with the American A-B-system plus the selector system to the C-boards.

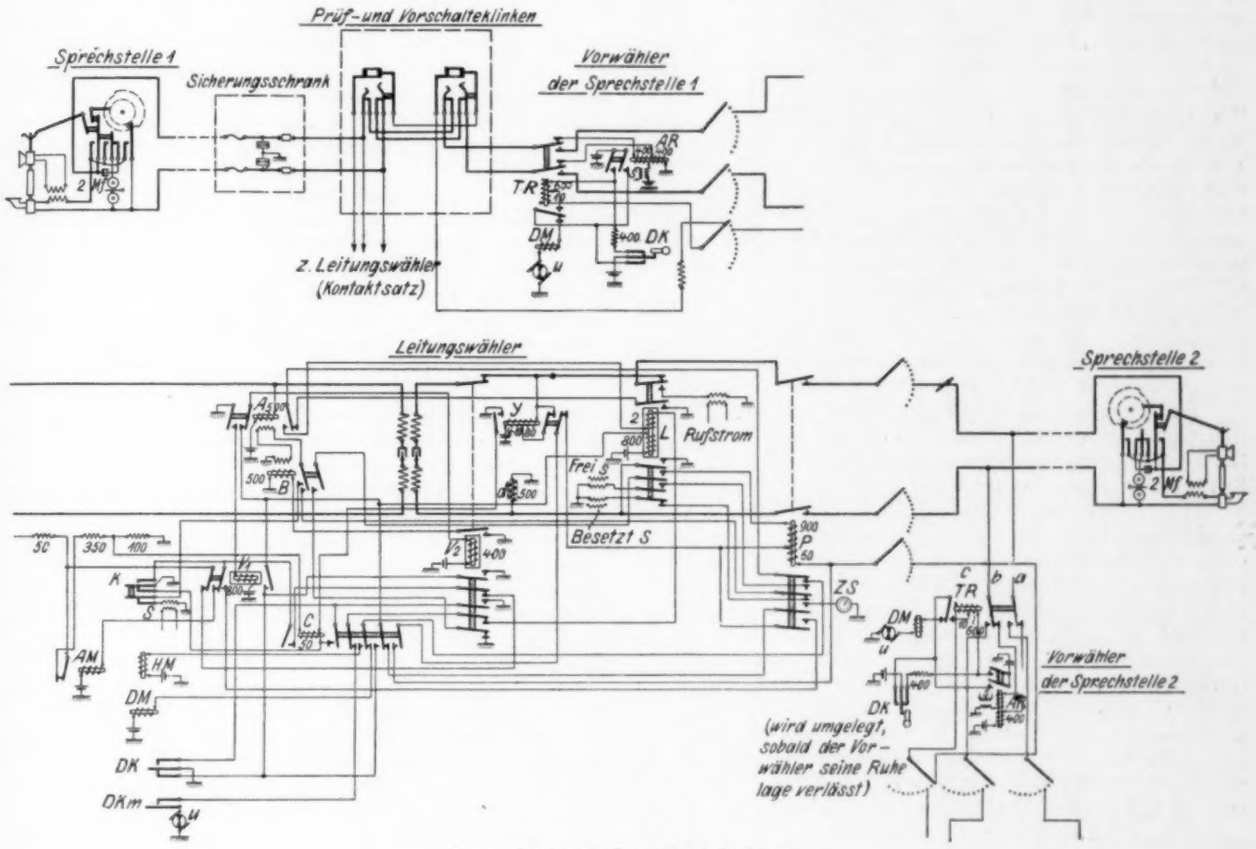


Fig. 2. Wiring for Small Rural Exchanges.

C. Advantages of the Selector System:—1. The answering time of the B-operator would be reduced, because this operator is relieved of the call by the act of

pressing down the group key once and does not have to speak further with the C-operator or wait for the plugging of the answering jack of the latter. The saving in time would be for each connection 3.1 seconds or 0.2 working units, and the average capacity would go down from 0.6 to 0.4 units. 2. At the C-boards the interchange of inquiry and answer between B- and C-operator is eliminated, as also the connecting and disconnecting of the answering plug. This saves the C-operators 4 seconds' work, or 0.25 units; their work is reduced from 1.2 to 0.95 units. On the whole such an exchange would use only (2.05—0.45)=1.6 units as against 2.05 units of the Hamburg exchange system and 1.95 with the American system. This saving of 0.35 or 0.45 units is equal, however, to a saving of 5.5 to 7 seconds per connection. For the 600,000 connections which the Hamburg exchange makes per day, the introduction of this system would mean a possible reduction of 190 operators, which is equivalent to an operating saving of $50,000 a year. 3. The use of the selectors would make it possible to subdivide the C-boards into two sections and thus to give to each of the two a simultaneous call. The short pauses that occur now in heavy traffic times (where the C-operator would seem busy to the B-operator, whereas it is mainly a question of two operators calling at the same time) would drop out, and in addition, greater number of calls coming in per unit of time would increase the speed of working of the operators. 4. The use of automatic selectors would reduce considerably the schooling needed at present for the B- and C-operators. At present these operators have to be trained quite long before they are considered efficient enough to serve at the B- and the C-boards.

D. Disadvantages of the Selector System:—1. The financial costs would be greater for this new system. If the Hamburg exchange had been constructed according to the selector system from the start the additional costs would have been higher by $125,000. This increased cost would have been met by an annual saving in operating costs of $50,000, and would have been covered within 2½ years. 2. Trouble is more likely to occur in the fine mechanisms of the selector; it is harder to locate, and requires a much better trained repair staff than is needed at present. 3. If the system were changed, the duty of registering the call would be laid in the hands of the C-operators and would cause this difficulty: The C-operator would have to be able to operate the registering device of the calling subscriber by way of the subscriber's line, and that would be possible only with considerable technical changes.

E. Tests with the Selector System:—At the time when the proposition was made to increase the efficiency of the C-operators in Hamburg, a test model was constructed and used for some time. The forty-part selectors were sufficient in themselves, but not as yet developed enough and safe enough to suit the Hamburg operation and the increase in efficiency of the C-operators was not great enough to warrant the additional expense, such a short time after the Hamburg system had been completely remodeled.—*By W. Pinkert. From paper to be read at the International Congress of Telegraph and Telephone Engineers at Bern, Switzerland, called off on account of the war.*

SMALL AUTOMATIC TELEPHONE EXCHANGES.

The following article taken from *Telegr. u. Fernsprech Technik*, discusses the problem of small automatic telephone exchanges for rural communities, where in the first place, greater improvements in telephone service are desired, and where it is necessary to have the postmaster, for example, be at the same time wire chief, operator and telephone repairman.

Unfortunately, the automatic system is still in a stage where its mechanical devices are fairly complex and rather delicate. Nevertheless, new improvements are being made each year so that parts giving trouble can be exchanged and replaced by good parts with very little trouble, giving no interference with telephone service. In spite of the high installation costs and the greater technical skill needed by the rural wire chief, the automatic system would pay in the long run, as it gives an almost unlimited possibility of growth which will serve the community for years to come, where one of the older manual systems might not do as well and would demand an operator on duty all the time.

For operation a storage battery of at least 60 volts is necessary. This will probably have to be placed in the exchange room itself, as space is often crowded. For that reason a prerequisite is that the battery must not generate noxious vapors that might harm either persons in the room or the apparatus. The battery must also be protected against overload and current impulses that pass beyond the normal limit. The batteries using iron and nickel for electrodes and potassium hydroxide as electrolyte (perhaps Edison batteries) in units of 50 cells would seem to be the best. The capacity of this type lies within 22.5 ampere hours, the discharge current strength is 4.5 amperes, the voltage per cell about 1.2 volts. Lead storage batteries are also suitable, provided equipment is installed to catch or dry the acid fumes. The battery is charged from the high tension current system, or, if such is not at hand, at a pinch, the telephone line might be used for that purpose. When charging from a direct current system, the excess voltage is eliminated by a resistance; when using alternating current a mercury arc rectifier is used for transforming. Battery, switchboard and rectifier can be placed on a common frame. The switchboard should contain, aside from the safety fuses and cut-outs and switches, a signal lamp which lights up during charging of the battery, also a signal contact, which shows a drop of the voltage of the battery below 55 volts.

For telephone instruments the ordinary common battery instruments with number discs could be used. The latter short-circuits the telephone system, as soon as it is brought into the rest position. On the return run of the dial pointer it interrupts the A-line, depending on the number called. The switchboard has an interrupter jack which can be used to test both the outside and inside wires, or else a subscriber's line can be switched on another pre-selector line, if the ordinary selector should give trouble, using for that purpose a three-conductor cord with two plugs. The wiring diagram of the test line is shown in Fig. 1.

Attention need only be called in this respect to the testing of the subscriber's instrument number dial. The subscriber is called after the test plug has been inserted into the outside-wire jack after which switch U has been laid over, and is then called by way of switch U_3. The subscriber is then asked to turn his dial pointer from the zero position to any desired point. The feed relay LR follows the current interruptions caused by this action, and a corresponding number of current impulses are felt through the central instrument, which show whether the subscriber's instrument works well or not. The retarding relay VR has been connected to interrupt

the call registration circuit. As soon as *LR* operates, *VR* attracts its armature and retains it during the current breaks from the number dial, acting in its capacity as retarding relay.

The automatic selector frame is made to hold as many as five sets, each set being independent of the other, so that a new one can be placed at will. In the lower part of the frame we can place as many as five line selectors and their relay sets. The subscribers are called by alternating current sent through their instruments at 10-second intervals, the current being generated by a pole changer with transformer. Pole changer, relay interrupter and 10-second impulse sender start automatically when a call is made.

The wiring diagram for the system is shown in Fig. 2. As soon as the subscriber removes his receiver, the pre-selector starts and stops at a free line selector. Here the *A, B, C* and V_1 relays speak. The line relays *A* and *B* serve as feed bridges for the calling subscriber. They remain attracted as long as the subscriber has the receiver off the hook. Only during the running of the dial pointer will the *B*-relay be found to be short-circuited for reinforcement of the current impulses reaching the *A*-relay by a contact V_2. The A-relay meanwhile falls away as often as the current is broken, and these current interruptions are passed on to the rotating electromagnet. When the calling subscriber hangs up his receiver the connection is broken. To prevent this happening when the current is interrupted by the number dial, the *A*-relay operates the retarding relay V_1, which holds the connection. The switch relay *C* speaks as soon as the pre-selector has reached a line selector, and remains attracted after the first series of current impulses. *C* is governed by the retarding relay V_2, which remains attracted as long as the current impulses are sent. The line relay *Y*, along with the choke coil *d*, furnishes the microphone feed for the called subscriber. This relay at the same time cuts off the calling current as soon as the called subscriber lifts his receiver. The test relay *P* tests the called line for busy wire and keeps the called line closed to other calls by short-circuiting the 900 ohm resistance. The calls are counted over the c-wire shortly before the line is disconnected, and depending on the fact that the called subscriber has answered, in other words, that the *Y*-relay operates. If a subscriber has more than one trunk wire, a rotary contact *Dkm* can be used which will turn until one of the open trunks is reached. The limited number of automatic exchanges used in rural districts has given great satisfaction, and offers unlimited possibilities for satisfactory and fairly inexpensive telephone service.

National Association Directors Meet at Chicago

The directors of the National Independent Telephone Association held a very important meeting at Hotel La Salle, Chicago, April 16 and 17. Directors H. D. Critchfield, Illinois; N. G. Hunter, Indiana; H. B. McMeal, Illinois; L. D. Kellogg, Illinois; C. Y. McVey, Ohio; W. C. Handlan, West Virginia; A. G. Bean, Ohio; T. W. Allen, Tennessee; A. F. Adams, Missouri, and F. B. MacKinnon, District of Columbia, were in attendance.

A committee on resolutions, composed of H. B. McMeal, chairman; Messrs. Bean, Adams, McMeen and Handlan, submitted a declaration of principles including revised resolutions and new resolutions which were unanimously adopted and are as follows:

Resolved, That the furnishing of telephone service is a business proposition in which the interests of the user and the company furnishing the service are interdependent. Telephone service is furnished under different conditions in different parts of the conntry. To meet these ever-varying conditions, we favor locally-owned, independent telephone systems, reserving to the people, however, in any locality (with the consent of the regulatory body having control) the right to determine for themselves what kind of telephone service they shall have and by whom it shall be given.

We favor the enactment of such laws as will secure to every local telephone system adequate long distance service, without discrimination and upon equal terms with every other such system, from all companies furnishing long distance service, thus giving universal service without universal monopoly.

Whereas, The American Telephone & Telegraph Company has not carried out the spirit and intent of the stipulation with the federal government under its letter of December 19, 1913, and

Whereas, The toll connection agreement now offered to independent telephone companies is grossly unfair,

Now, therefore, be it

Resolved, That a committee of three be appointed to confer with the department of justice and the Interstate Commerce Commission with the view of securing a fair toll connection contract, and if suitable action cannot be obtained under present conditions, that this committee be instructed to work for the enactment of such physical connection laws as will secure interstate long distance connections for independent telephone companies under the supervision of the Interstate Commerce Commission.

Whereas, The immediate future bespeaks renewed prosperity for the independent telephone business and the demands of the future looking to the legitimate extension of the business, and the protection of the properties now in the independent field are such as to demand the united efforts of all independent telephone men in the United States, and

Whereas, We believe there are no weighty reasons why all independent interests should not and cannot be united;

Therefore, be it resolved by this board of directors, That the "get-together" committee of this association be instructed to use every effort to bring about a consolidation of the two national associations and that each member of this board work with this committee to speedily bring about the above result.

Whereas, There is a growing demand for independent telephone securities throughout the country,

Therefore, be it resolved, That this board approves the formation of companies for financing of independent telephone companies and the marketing of independent telephone securities.

Believing that there is at this time an overlapping of jurisdiction and a duplication of control by state commissions and the Interstate Commerce Commission, which produces unnecessary expense and uncertainty that should be eliminated, we favor an act by Congress providing that the control and regulation of exchange business and purely local or intrastate toll business shall be left entirely to the states.

We favor the enactment of such laws, if any be necessary, to prohibit any corporation, partnership or individual furnishing telephone service, from engaging in the manufacture of apparatus, material or supplies except for its own use.

In accordance with this resolution the president appointed C. E. Tarte, Citizens' Telephone Company, Grand Rapids; Frank A. Davis, Ohio State Telephone Company, Columbus; and T. W. Allen, Jackson, Tenn., members of the committee. The association president and secretary will act as ex-officio members.

The directors devoted considerable time in discussing telephone conditions in general throughout the country, and in the forenoon of April 17 held an informal meeting with the directors of the Independent Telephone Association of America.

Addresses of co-operation between the two independent associations dealing especially with the A. T. & T. toll line agreement were delivered by Messrs. Hunter, McVey, Critchfield and McKinnon of the National Independent Telephone Association, and by Messrs. Reber, Bryant, Randall and Fisher of the Independent Telephone Association of America.

Telephone in the German Military

Among the apparatus which the German army has specially studied we may note the various appliances of telephony for communication between patrols and the main body, between troops in charge of the railway service, and between the signal corps of the army.

The properties of telephony which make it of great importance for military use, are its simplicity and the high speed of communication it affords. The growing number of soldiers engaged in battles and the wide dispersion of the various corps on areas more and more extended, make it absolutely necessary that the signal corps possess means of prompt and sure communication. While radio-telegraphy, as well as wire telegraphy, may be of value for long distance communication, the telephone is essential for short distance communication with a minimum of delay and a maximum of clearness.

The German army uses four principal types of apparatus. The first is a light equipment with a high-frequency vibratory device used for the calling signals and for communication by Morse signals. This apparatus is used by patrols, the signal corps, and the field artillery. The second type of apparatus employs a magneto coil, and this is used for railway troops.

The third type is a combination of the first two, and is used for communication between corps; while the fourth is a loud-speaking telephone apparatus. The high-frequency vibrator is arranged to be connected with telegraph lines without interfering with the telegraph signals. Each post is fitted with the necessary source of power and a length of flexible cable. In the lighter, portable apparatus the line of insulated wire is carried on light reels which may readily be transported by the men without unduly hampering their movements. The heavier apparatus with its coil of cable used for the signal corps is carried on light trucks. The lines are laid on the ground or on poles, trees, etc., or in dry trenches. Field stations are connected with the existing telegraph or telephone circuits. When desired, as, for instance, for the military railway troops, special permanent lines of bronze wire are installed.

Time Studies of Corwin Semi-Automatic

The Corwin semi-automatic telephone system at Fort Wayne, Ind., has given the operating field some interesting figures and offered an opportunity for unusual traffic studies, but the information we are here able to print is, to say the least, unusual, especially as its accuracy is vouched for by the Frank B. Cook Company, which manufactures the Corwin system.

Heretofore it has been necessary to depend largely upon manual methods for obtaining time study figures relating to the length of time involved in the operations of the component parts of a telephone system, but in the Corwin system these time elements are readily studied and the figures readily obtained with accuracy. In fact, it is only in the Corwin system that these accurate time studies are obtainable, the maker claims.

For instance—if we had heretofore wanted to know the exact average time that the cords in an operator's position averaged as *actually busy*, it would have been a most difficult task to secure the necessary figures, but the Cook company tells us that, at the South exchange at Fort Wayne, an average obtained over a study embracing several thousand calls shows the following interesting average figures:

	Seconds
Actual cord busy time	109.2
Actual "subscriber's conversation" time	115.8
Actual "subscribers listening to busy" time	6.24
Actual ringing time	15.9

Further figures, whose accuracy is assured, show that 6.72 per cent of originating calls result in "Don't answer"; 12.26 per cent of originating calls result in "Busy."

We are confident these figures will prove interesting to operating men as a whole, and we believe the Frank B. Cook Company, Chicago, Ill., will be glad to furnish additional time study figures to those who are sufficiently interested to ask for them.

Uruguay to Have Telephone System

In an interview given out by the president of the National Power Houses Board, Señor B. Lasgoity, Montevideo, Uruguay, it is stated that part of the profits of the national electric light and power system will be applied to the construction of the national telephone lines, which will be subterranean in the capital city and aerial in the interior. Tenders will be called for to supply either an automatic or a manual system, and the kind of system will be decided upon after the bids are made. A double copper circuit with central battery system will be used, and the aerial lines will also have a double copper circuit. The line will cover a wide area, embracing the capital and contiguous departments. The total cost is placed at $2,500,000.

To effect all this the governmental power house must be considerably improved. It is intended to increase its capacity with an alternating turbine of 8,000-kilowatt power. Another plan under consideration is to transform some of the boilers in order to burn crude petroleum, which is cheaper than coal and vacillates less in price.

American Poles for Greece

Three boat loads of Western Electric telephone poles are now on their way across the ocean with Greece as their destination. This unusual pole order was received from the Greek government, which will use the poles in extending present telephone facilities. The shipments were made in forty-five carloads and consisted of 15,000 4-inch top, 20-foot, and 2,000 5-inch top, 25-foot Northern cedar poles of first quality, says the *Western Electric News*.

Considerable trouble was experienced in obtaining suitable shipping facilities because of the timidity of ship owners, caused by the uncertain safety of shipping in European waters. The forty-five cars were thus held up at New York for over a month, the delay resulting in a demurrage expense of about one thousand dollars. Eventually, however, three freighters were chartered and the entire shipment, weighing in all 2,000,000 pounds, started on its way on April 3.

The poles were personally inspected by the Greek consul general for the United States, C. Vassardakis, acting under his government's orders.

Spring literature from the manufacturers includes a booklet on the Standard Underground Cable Company's exhibit at the Panama-Pacific Exposition and a folder about the same company's Colonial Copper-Clad wire.

Operating and Co-Operating

Formal and Informal Rules that Help the Independents

Operating Suggestions

As Recommended by Miss Gang, Traveling Chief Operator of the Illinois Independent Telephone Association.

THINGS TO REMEMBER.

1. Care of rest room.
2. Reporting for duty.
3. Entering operating room.
4. Position at the switch board.
5. Transmitter close to lips.
6. Voice.
7. Repeating numbers.
8. Testing line.
9. Team work.
10. Cord handling.
11. Supervise calls.
12. Do not use the word "Hello."
13. Ring slowly and distinctly.
14. Secrecy of communication.
15. Do not get important.
16. Keep smiling.

LOCAL PHRASES.

"Number, please."
"What number please?"
"Line——is busy."
"Did they answer?"
"I will ring (number called) again."
"Number called don't answer."
"Operator."
"I will give you long distance."
"Are you waiting?"
"Are you through?"

DISTINCT ENUNCIATION OF NUMBERS.

The following examples illustrate the correct articulation of digits:

"O" to be spoken as "Oh" with long O.
"1" to be spoken as "Wun" with strong N.
"2" to be spoken as "Tew" with strong T.
"3" to be spoken as "Th-r-r-ee" with a slightly rolling R and long E.
"4" to be spoken as "Fohr" one syllable with a long O.
"5" to be spoken as "Five" with a long I and strong V.
"6" to be spoken as "Six" with a strong X.
"7" to be spoken as "Sev-en" two syllables.
"8" to be spoken as "Ate" with a long A and strong T.
"9" to be spoken as "Ni-en" two syllables.

LONG DISTANCE PHRASES AND METHODS.

ANSWERING SIGNAL.

"This is long distance."

Information operator should get from patron when recording ticket.—Permit patron to give ticket in his own way, asking only such of the following questions as may be necessary to get the needed information:

RECORDING OPERATOR'S PHRASES.

"What is your number?"
"What is your name?"
"Is that your telephone?"
"Has he a telephone?"
"If he hasn't, is a messenger O. K?"
"Where will we find him?"
"If he isn't there will you talk to anyone else, or shall I leave word?"

ACKNOWLEDGING TICKET.

"We will call you in just a moment."
"Will you be there?"

TESTING CIRCUIT.

First, always listen—wait at least, three seconds, and if line is not busy, say:
"This is (name of station)."
"Are you waiting?"
"Are you through?"
To be said slowly and distinctly.

SIGNALING.

All signals should be given slowly and distinctly. A "long" ring should be of three seconds duration. Fifteen seconds should be allowed to elapse before signaling again.
Remain on circuit until answer is secured.

PASSING A "SENT PAID" TICKET.

"This is (name of station)."
"Ticket 230-254 is calling E. H. Smith and Company A. B."
To be passed slowly and distinctly.

PASSING A "SENT COLLECT" TICKET.

"This is (name of station)."
"Ticket Collect" 230-254 A. L. Barker is calling E. H. Smith —if U. D. L. W."
To be passed slowly and distinctly.

PASSING AN APPOINTMENT TICKET.

"This is (name of station)."
"Ticket appointment for 4:30—230-254 A. L. Barker is calling E. H. Smith. If U. D. L. W."
To be passed slowly and distinctly.

PASSING A MESSENGER TICKET.

"This is (name of station)."
"Ticket messenger 2:30—254 is calling E. H. Smith at 326 Locust street. If U. D. W. T. A. Y."
To be passed slowly and distinctly.

RECEIVING TICKET.

All tickets to be recorded on "Received" tickets as passed by originating operator using due diligence to properly designate if Received Collect, Appointment, or Messenger; and also to make sure that ticket as recorded is correct and complete. If ticket as passed is not clearly understood, request operator to "Please Repeat."

ANSWERING SIGNAL FROM DISTANT STATION.

"This is (name of station)."
Remain on circuit until ticket order or report is passed.
"Do you want A. Y. or A. B.?"

APPOINTMENT TICKET.

If an "Appointment Ticket," say:
"Long distance is calling E. H. Smith."
If answer indicates that Mr. Smith is talking, say:
"Mr. A. L. Barker at (name of station) wishes to talk with you at 4:30."
If called party answers and authorizes the appointment, report: "4:30 appointment O. K."

MESSENGER TICKET.

Originating operator should be advised of amount of messenger charge and messenger dispatched at the earliest possible moment.

Note.—On passing reports on delayed tickets they should be made sufficiently full and complete so that the identity of the ticket may be established, and that the originating operator may understand reasons for delay and progress being made. As far as possible the official code should be used.

REACHING PARTY CALLED.

If line is available signal the number. Repeat signals at intervals of thirty seconds, if necessary, until three signals have been given.
Remain on line in readiness to answer party called.

RECEIVED PAID TICKET.

When answer is received, say:
"Long distance is calling E. H. Smith."
If called party answers and is ready to talk, report "W. H."

RECEIVED COLLECT TICKET.

"Long distance is calling E. H. Smith."
If answer indicates that Mr. Smith is talking, say:
"Mr. A. L. Barker at (name of station) is calling you and wishes you to pay the charges."
If called party answers and is ready to talk, report: "W. H. O. K. Collect."

OFFICIAL CODE.

Absent. Not expected today	U. X.
Anyone	A. Y.
Anyone who can talk business	A. B.
Appointment call	APT.
Busy personally	B. P.
Chief operator	C. O.
Cannot locate	C. F.
Cancel	C. A.
Collect	K. L.
Does not answer	D. A.
Discontinued	D. S.
Get better address	G. B. A.
Give firm name of party called	F. N.
Give name of party calling	W. O.
Keep after	K. A.
Leave word	L. W.
Left telephone	L. F.
Looking for telephone number	L. N.
Messenger	M. G.
Messenger not returned	B. N. R.
Name asked for but not given	R. N.
No circuit available (busy circuit)	N. C.
No circuit available. Call order left	N. C. O.
No report to give	N. R.
No telephone listed	N. F.
Not registered (at number called) and cannot find there	N. R. G.
One of the firm	O. F.
Out, don't know when will return	U. D.
Out, expected at (time)	U.
Out of order	O. D.
Party has not called	P. N.

NOTE.—To be used in case a report has been previously given that person has been notified to come to the telephone to talk.

Report on	O. R.
Telephone busy	B. Y.
Telephone has not answered yet	N. A.
Telephone reached and looking for party	L. K.
Try again	A. G.
Unable to get party called to come to the telephone	K. T.
Unknown	U. N.
We have	W. H.
Will call	W. C.
Will talk	W. T.

National Line Committee Meets

The sixth meeting of the National Joint Committee on Overhead and Underground Line Construction was held on Wednesday, March 31, from 10:30 a. m. to 5:00 p. m., in the rooms of the American Institute of Electrical Engineers, New York City.

The committee devoted most of its time at this meeting to discussing the various clauses of the overhead power wire crossing specification, and the work of revision was gotten well under way.

The specification was divided into four sections and the following sub-committees appointed to handle the work of revision on their respective sections:

Sub-Committee "A" (Structural)—F. L. Rhodes, chairman; G. A. Harwood, R. J. McClelland, R. D. Coombs, J. H. Davis.

Sub-Committee "B" (Insulation)—W. J. Eck, chairman; Percy Thomas, F. B. H. Paine, R. E. Chetwood, E. B. Katte, A. S. Richey.

Sub Committee "C" (Conductors)—Paul Spencer, chairman; Thomas Sproule, George Cellar, W. I. Capen, R. J. McClelland, H. T. Wreaks.

Sub-Committee "D" (Clearances)—C. L. Cadle, chairman; G. F. Sever, W. J. Canada, L. S. Wells, H. S. Warren, E. B. Katte.

Circular letters have been issued to operating companies, tower manufacturers, consulting engineers, and others, requesting that they furnish the committee with data, reply to a series of questions, and forward opinions regarding the proposed specifications.

What the committee particularly desires at this time is the suggestion of specific clauses, or paragraphs, to be added to or changed in the existing specifications, and it is hoped that anyone interested in this subject will communicate at once with the committee.

Interstate Commission Abandons Wire Inquiry

The abandonment of the wire inquiry by the Interstate Commerce Commission is understood as Washington's formal approval of carrying out the A. T. & T. Company's anti-trust agreement with the Federal government.

The inquiry was first started in January, 1913, and came as the result of a complaint made by the Postal Telegraph Company stating that the A. T. & T. Company and the Western Union Telegraph Company were monopolizing the business. It was generally understood that the commission could acquire data sufficient to present such a trust monopoly to the department of justice.

Dismissal of the investigation is accredited to three reasons, namely: Limited jurisdiction over telephone and telegraph companies; great cost with but a probability of satisfactory costs; that a physical valuation of wire system is already being made.

The dismissal of this inquiry, according to the commission, however, does not prohibit the institution of private complaints.

Agreement between the A. T. & T. Company and the government was announced a few months after the inauguration of President Wilson. It was agreed that the Western Union Telegraph Company and the A. T. & T. Company should become separate institutions. The attorney-general has approved this agreement and consequently the dropping of the inquiry.

Canada Telephones Increase

According to the annual report of the Canadian comptroller of statistics of the Railway and Canals Department, the telephone business of Canada is steadily increasing, while the telegraph business shows for the past year, at least, a decrease in earnings.

The telephone business of Canada for the year ending June 30, 1914, showed an increase of over two and a quarter millions in gross earnings, while the telegraph companies reported a decrease of $112,000 as compared with 1913.

Gross earnings of the telephone companies last year totaled $17,297,268, with gross operating expenses of $12,882,402.

Net earnings were $4,414,866. Gross earnings were equal to $33 per telephone in use, and the operating expenses averaged $24 per telephone.

The total number of telephones in use is 521,144, or one for every fifteen of the population. Only one other country, the United States, is known to have as large a per capita number of telephones as Canada has.

The gross earnings of the Canadian telegraph companies last year totaled $5,983,204, against $6,095,212 in 1913. Operating expenses were $4,242,539, against $4,034,480. The net profits were $1,741,665 on a capital cost valuation of $9,255,137. There were 6,150 employes in the telegraph service in 1914, of whom 319 were females.

Public Utility Commission News

Reports Concerning the Activities of State Regulating Bodies in the Telephone Field

New York

NEW YORK Public Service Commission has decided the New Hartford and Whitesboro telephone rate cases by requiring the New York Telephone Company to extend its Utica rates so as to apply to the New Hartford and Whitesboro exchange areas, thus eliminating the toll charge of 5 cents for number calls and 10 cents for particular person calls which respondent established sometime after taking over the Utica Home Telephone Company property, and which is the basis of the six complaints in the cases which are decided. Extension of the Utica rates to New Hartford and Whitesboro is accompanied by an amendment which provides a four-party business rate in New Hartford and Whitesboro.

The Utica Home Telephone Company had in effect certain rates for New Hartford and Whitesboro, which gave subscribers the right to talk with Utica, and certain rates for Utica which gave subscribers the right to talk with New Hartford and Whitesboro, and subscribers in New Hartford and Whitesboro were entitled to talk with each other. The Utica Home Telephone Company's property was taken over through purchase by the New York Telephone Company. By the consolidation the Utica rates for former Home company's subscribers were raised. After the consolidation the New Hartford and Whitesboro rates were slightly changed. A year afterward, the right to talk under local contract rates between Utica and New Hartford or Whitesboro was taken away and a toll charge instituted, which constituted another increase in rates and diminished the value of the service rendered to subscribers in New Hartford and Whitesboro and also to subscribers in Utica. This toll charge also carried a material increase in rates to people residing in New Hartford and Whitesboro, who had large use for Utica service and to get it most economically were obliged to take Utica rates plus mileage charges and be confined to Utica service except on paying a toll to talk with their neighbors in New Hartford or Whitesboro. Under these restricted service conditions the number of subscribers in New Hartford and Whitesboro considerably diminished.

Prior to the consolidation the Utica Home Company had in New Hartford 250 telephones and in Whitesboro 266 telephones. On September 1, 1914, the New Hartford telephones had diminished to 137 and the Whitesboro telephones to 245. The commission found that the real diminution in service and value of service was caused by putting in a toll charge to and from Utica.

The commission states that telephone rates in this flat rate territory should be so arranged as to induce the freest possible use of its service and that the telephone has become for most people of business and household importance, with many a practical necessity.

The commission also states that if authority to suspend advanced telephone rates pending investigation had been conferred upon the commission before these complaints were filed, the proceeding would have been simplified, the subscribers so greatly dissatisfied with the introduction of the Utica toll rate would have retained their telephones pending investigation and order, and the whole matter would have been disposed of to the better satisfaction of al parties. The legislature has been asked to amend the law in this respect.

The main features of the report of the Thompson legislative committee, which was recently presented to the legislature, include the authorization of the First District Public Service Commission to supervise telephone companies in New York city; reduction of the commission from five to three members; enforcement of the law making corporation officials criminally liable for failure to obey decisions, and the appointment of deputies of the commissioners to take depositions.

The New York Telephone Company has accepted the schedule of reduced rates fixed by the Public Service Commission. This includes the five cent charge for New York city. The new schedule will go into effect July 1.

The maximum charge for subscribers' direct line service will be $40 for 800 messages a year. The price will decrease to a 2½ cent basis as the number of messages increases. Besides doing away with extra charges for calls between Manhattan and Brooklyn, local zone areas will be widened and tolls to outlying boroughs reduced at an estimated saving of $3,000,000 to consumers.

Washington

While holding that the commission has the power to order a physical connection between two telephone companies, the supreme court in a recent decision affirms the Thurston county superior court in declaring invalid the order of the commission in the case of the state on the relation of the commission, appellant, against the Skagit River Telephone & Telegraph Company and the Pacific Telephone & Telegraph Company.

A complaint was filed by residents of Sedro-Woolley asking that physical connection between the Skagit River Company and the Puget Sound Independent Telephone Company be ordered by the commission. The Puget Sound Company, which operates to the west of Sedro-Woolley, agreed to abide by the order of the commission when it was made, but the Skagit River Company refused to comply with the order because of its contract with the Pacific Telephone & Telegraph Company.

The latter company then started the fight to have the order of the commission annulled.

Commission investigators are working in the head offices of the Bell Telephone Company in Seattle, and by June they will be ready for the general hearing to consider rates charged by the telephone company in Spokane and throughout the state.

Although the rate inquiry in the old Spokane case has been practically finished it was deemed best to consolidate it with the rate inquiry throughout the state. These rates will be based on the average length of conversation and the average distance over which conversation is held. To get at the average length of conversation experts have checked 100,000 calls.

Canada

The Board of Railway Commissioners of Canada has ordered the Bell Telephone Company to make the telephone rates in North Toronto the same as those in the rest of the city. The order will go into effect on January 1, 1916. This decision ends a two-year-long fight for the city rates.

Minnesota

A fight of fifteen years' duration for state control of telephone lines virtually came to a close when the House of Representatives repassed the Minnette-Burrows bill, as agreed on by the conference committee of the House and Senate, which places the jurisdiction of telephone companies under the Minnesota Railroad and Warehouse Commission, which is empowered to fix rates, compel physical connection of competing lines and govern other regulations.

The bill now goes to the governor, who is reported to have signified his intention of signing it.

Pennsylvania

The Pennsylvania Public Service Commission has approved an ordinance contract of the Bell Telephone Company and the boroughs Wernersville, Tamaqua, Lebanon Independent and Robesonia, and an ordinance contract of the Central District Telephone Company and the borough of Tarentum.

Illinois

The DeKalb County Telephone Company has filed a petition with the Public Utilities Commission of the State of Illinois for a hearing at which time it will try to show that it is not making a sufficient revenue on its business in DeKalb to enable it to keep up its equipment properly and the standard of service which it wishes to give the public.

It asks to be allowed to raise the yearly rental on residence telephones from $21 per year to $24 for the individual lines and from $15 per year to $18 for the two-party lines. No increase has been asked for the business service.

Nebraska

The Nebraska Railway Commission has given permission to the Burt County Telephone Company to issue $10,000 of bonds to take up $10,000 of bills payable which cover the purchase price of the Oakland telephone exchange.

Wisconsin

The Wisconsin Commission has dismissed the petition of the Bangor Telephone Company for an order requiring the Milwaukee Electric to discontinue operation of the automatic electric signal system on its line at Bangor or contribute to the expense of the telephone company in changing its telephone line along the railroad from a grounded to a metallic system. The telephone company complained that the railroad's signal system carried such a high voltage it greatly interfered with the operation of telephone lines running along the tracks.

Montana

The Public Service Commission of Montana has been applied to to make an order directing the Bell Telephone Company to reduce its rates. A complaint has been filed with the commission, alleging that the Bell Company has violated an agreement it made with the Butte Chamber of Commerce not to raise telephone rates after it should have absorbed the independent company, and is charging $5 a month instead of $4 for two-party phone service.

It adds that the increase of the business of the Bell company through its absorption of the Independent business and revenue will enable it to make a 50 per cent reduction in its charges for service and that it should make such reduction.

Indiana

In a hearing at Indianapolis by the Indiana Public Service Commission, the petition of the Cumberland Telephone and Telegraph Company to transfer to the Southern Indiana Telephone Company its property in Kentucky, including forty-four exchanges, was heard, but no finding was rendered by the commission. It was indicated that the permission wil be granted. Incidentally, it was stated by a member of the commission that the rate dispute, affecting the Indiana territory served by this company, would be settled within fifteen days. A time was set for hearing this matter some time ago but was deferred on showing of the company that it had under consideration a new schedule of prices. Then it was announced there would be a hearing in March, but no date was set. A new ratecard, eliminating discrimination and said to affect only slightly the company's income, has about been worked out, it is said.

The Cumberland scheduled its Indiana property at $2,050,000, but the commission cut this down in a measure and placed the figures at $1,790,000. Permission to issue stock was not asked at this time but that question wil be brought up later. The new company will also ask approval of an issue of $80,000 working capital.

Ohio

Whether the Central Union Telephone Company is justified in its refusal to place a private exchange in the office of the Builders' Exchange of Dayton, without the payment of a switchboard rental of $1 per month, in addition to $5 per month for each extension, is a question that will be decided by the Ohio Public Utilities Commission, on an appeal taken by the secretary of the Builders' Exchange.

The extensions asked would run into offices of various members of the exchange maintained in that portion of the Fourth street Arcade allotted to the exchange. The builders maintain that the company should install a switchboard and furnish as many extensions or stations as are desired at the regular rate for stations of $1 per month. The company contends that the offices, which are those of private contractors, would be enjoying practically single line service and that they should pay the regular rate.

It is declared that the members of the exchange, although engaged in separate businesses, are shareholders in the exchange, and as members on an equal basis, should enjoy a rate on a level with the officers.

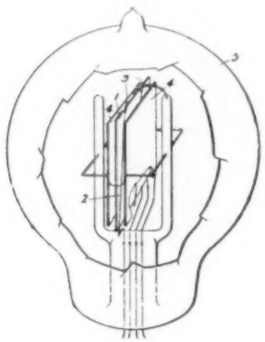
Telephone Patents Issued in March

A Brief Digest of those Current Specifications Most Interesting to Telephone Men

BY DAVID S. HULFISH

PATENT No. 1,129,840. Desk Telephone. Issued to Harry A. Bates, Galesburg, Ill. A latch in the hook of a desk telephone prevents the hook from jiggling (and flashing the line lamp) when the recever is on the hook and the telephone is moved upon the desk without intent to call central.

1,129,942 and 1,129,943. Gaseous Repeaters. Issued to H. D. F. Arnold, East Orange, N. J., assignor to Western Electric Company, New York, N. Y. Specific arrangements of gaseous or thermionic repeating elements in series and in multiple.

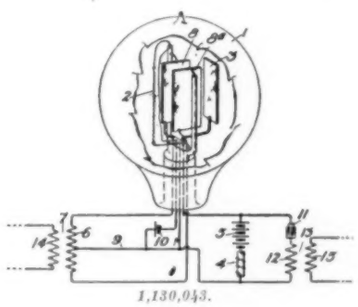


1,130,008.

1,129,951. Switchboard. Issued to E. S. Browning, Keefeton, Okla. The keyboard of the frame is made rounded, with contact plates, and the keys consist of pivoted levers which engage the contact plates, the levers being at the axis of the rounded surface.

1,129,959. Repeater System. Issued to E. H. Colpitts, East Orange, N. J., assignor to Western Electric Company, New York, N. Y. A patent upon specific combinations of circuits with gaseous speech amplifying devices.

1,130,008 and 1,130,009. Audion. Issued to A. M. Nicholson, Tarrytown, N. Y., assignor to Western Electric Company, New York, N. Y. The "audion" is a device of a sealed glass bulb containing electrodes and circuits for producing and controlling effects with ions and heating effects with a view to amplifying small fluctuating currents, such as tele-



1,130,043.

phone speech currents. The device is called also a "thermionic repeater." These two patents cover two specific arrangements of parts in the bulbs.

1,130,029. Transmitter. Issued to Herbert E. Shreeve, Milburn, N. J., assignor to Western Electric Company, New York, N. Y. The electrodes are horizontal. The lower is flat; upon it is the granular carbon; the upper electrode dips a circular edge against or into the carbon, and operates vertically by the horizontal diaphragm, the surface in contact with the carbon granules varying with the movement of the electrode.

1,130,042. Audion. Issued to H. J. Bijl and A. M. Nicholson, Tarrytown, N. Y., assignors to Western Electric Company, New York, N. Y. A specific arrangement of the parts in a thermionic bulb as part of a thermionic repeater.

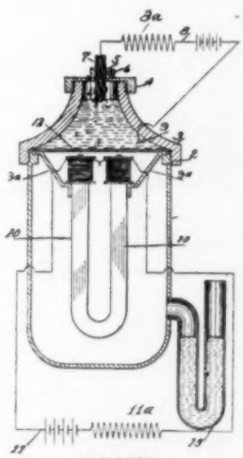
1,130,043. Repeater System. Issued to H. J. Bijl, assignor to Western Electric Company, New York, N. Y. An arrangement of a thermionic device in an inductive circuit for repeating in a telephone line.

1,130,077. Method of Making Contact Points. Issued to B. E. Eldred, Bronxville, N. Y. (Filed January 25, 1910.) A platinum sheet is soldered to a nickel sheet, the joined sheets are rolled thin, and contact points tipped with platinum are punched from the sheet.

1,130,190. Automatic Switchboard Frame. Issued to Charles H. North, Cleveland, Ohio, assignor to Frederick C. Stevens, Attica, N. Y. A switchboard frame upon which multiple unit sections of automatic switch apparatus may be mounted.

1,130,522. Party Line Detector. Issued to C. A. Kramer, Spokane, Wash. In connection with the switch hook lever is a hammer which taps a bell when the receiver is lifted; the bell is heard upon the line (through the transmitter of the telephone) and the parties speaking are advised that another party is listening upon the line.

1,130,608. Attachment. Issued to P. A. Johnson, Springfield, Ore. This attachment also produces a predetermined signal when the receiver is lifted from the hook and the lever



1,130,654.

1,130,654. Speech Relay. Issued to H. A. Allensworth, Columbus, O. In a speech relay of the type using an electromagnetic receiver and a variable resistance, a fluid is interposed between the receiver diaphragm and the resistance and a special fluid column is provided for balancing the pressure of the fluid on the receiver diaphragm.

1,130,697. Automatic Extension Line. Issued to F. Aldendorff, Antwerp, Belgium, assignor to Western Electric Company, New York, N. Y. In an automatic telephone exchange, upon a line having extension telephones, the main station may extend the control of the connection to the extension station, at will.

1,130,784. Measured-Service System. Issued to Bernard D. Dillis, Chicago, Ill., assignor to Automatic Electric Company, Chicago, Ill. In a manual switchboard, interfering facilities for the registering circuits are provided, to enable to operator to converse with the calling patron at will, yet to enforce proper registration before conversation between the two telephones of the connection.

1,131,140. Automatic Switch. Issued to William Kaisling, Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. In an automatic switch, restoration is effected by moving the wipers off the end of the row of fixed points, the restoration then being mechanical.

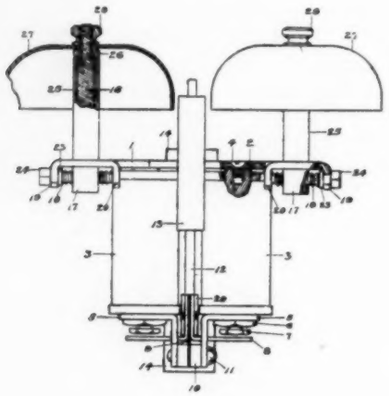
1,131,250. Repeater System. Issued to C. D. Lanning, Boston, Mass. (Application filed December 26, 1905.) Both

primary and secondary circuits of the repeater element are connected inductively with one wire of the telephone line, free of bridge connection between the two wires.

1,131,251. Rpeater System. Issued to C. D. Lanning, Boston, Mass. As above, but with a condenser between the two connections in the line wire, and with adjustments.

1,131,389. Combined Drop and Jack. Issued to William Leaver, Chicago, Ill., assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. (Filed December 9, 1908.) The claims pertain to the removal of the coil from the drop without disturbing the other structural parts of the device.

1,131,598. Telephone. Issued to W. M. Byrnes, Vail,

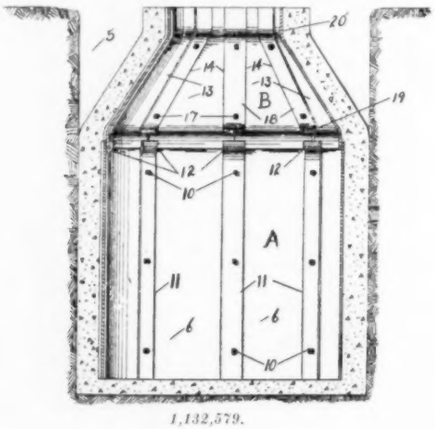


1,132,249.

Iowa. After the telephone is lifted, the battery circuit may be closed manually if desired, but is broken automatically when the telephone is hung up.

1,131,624. Telephone. Issued to John Erickson, Chicago, Ill., assignor to First Trust & Savings Bank, Chicago, Ill. (Application filed November 12, 1906.) To give an earth impulse for release, the switch lever rotates a heavy disk which closes the earth circuit and breaks it after a suitable interval.

Reissue 13,890. Call-Distributing System. Issued to J. H. Levis, Jr., assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. (Reissue of No.



1,132,579.

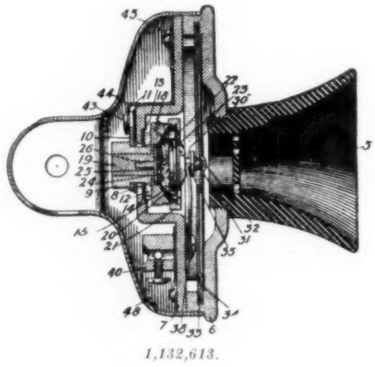
1,100,749.) Each operator's position has a selecting relay and a "barring relay" which prevents further calls pro tem after the selecting relay has been operated.

1,131,734. Line Switch. Issued to J. N. Reynolds, Greenwich, Conn., assignor to Western Electric Company, New York, N. Y. Multipled terminals of the trunks are placed on trunk bars and of the lines on line bars and the mechanical structure is such that by rotating the bars the desired connections can be made between the lines and the trunks.

1,131,811. Selector. Issued to F. Aldendorff, Vieux Dieu, near Antwerp, Belgium, assignor to Western Electric Company, New York, N. Y. In a trunk selector for automatic exchanges, the telephone user has the power to advance the selection over trunks which are either idle or busy.

1,131,911 and 1,131,912. Call Distributing System. Issued to H. P. Clausen, Rochester, N. Y., assignor to Western Electric Company, Chicago, Ill. Some telephone lines are not subject to distribution and extend permanently to operator's positions, which others are subject to distribution, and the invention provides interference whereby the lines subject to distribution can not be distributed to any position where one of the permanent lines is calling and remains unanswered.

1,132,107. Automatic System. Issued to F. Merk, Charlottenberg, Germany, assignor to Siemens & Halske, A. G.,

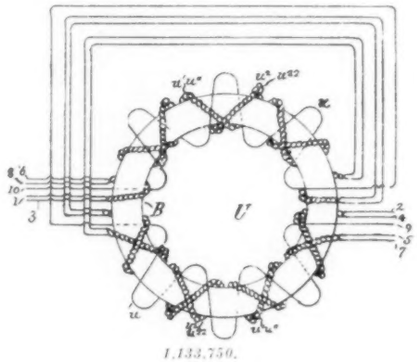


1,132,613.

Berlin, Germany. Circuits for holding and releasing the automatic switches, Strowger system, where a signal repeater is placed between the line switch and the first selector.

1,132,249. Ringer. Issued to Lawrence Ericson, Chicago, Ill., assignor to Kellog Switchboard & Supply Company, Chicago, Ill. (Application filed November 15, 1906.) A detail of adjustment for the position of the ringer gongs, a screw adjustment being provided.

1,132,404. Receiver. Issued to Curt Stille, Zehlendorf, West, near Berlin, Germany. A diaphragm has a grating and a grating cover; a current of air blows continuously through the diaphragm, and an electromagnet slides the grating cover



1,133,750.

as a valve, whereby the diaphragm is moved by the air under control of the magnet.

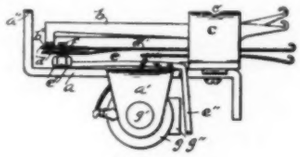
Reissue 13,891. Original 1,073,589. Call-Distributing System. Issued to Sidney H. Browne, Short Hills, N. J., assignor to American Telephone & Telegraph Company, New York, N. Y. In a call-distributing system, each line has a trunk-finding switch and a relay which connects the line to the wipers of the switch only after a trunk has been found by the switch.

1,132,579. Mold. Issued to Harry E. Hamilton, Fountain City, Ind. A collapsible frame for molding a concrete wall within a manhole.

1,132,613. Transmitter. Issued to J. C. R. Palmer, Brooklyn, N. Y., assignor to Western Electric Company, New York, N. Y. The fixed electrode of the carbon cell has a conical wall.

1,133,111, 1,133,112 and 1,133,113. Call-Distributing System. Issued to Francis W. Dunbar, Chicago, Ill., assignor

to Kellogg Switchboard & Supply Company, Chicago, Ill. (Applications filed January 13, 1905; March 17, 1905; October 11, 1906.) In a call-distributing system certain trunks may be able though idle to refuse a searching line when certain other trunks are idle. A meter is operated by the answering switch hook and locks, being unlocked by a relay connected to the ringing plug circuit. Where more than one switch is required to connect a line to a trunk, all the switches operate simultaneously.



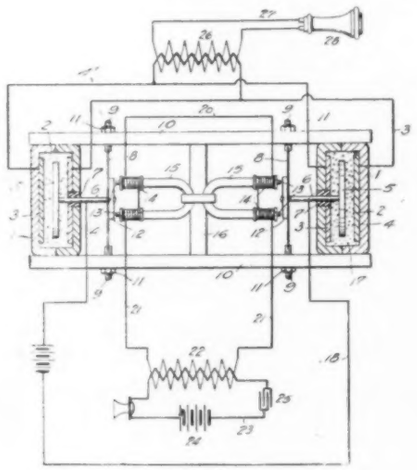
1,133,787.

1,133,264. Call-Distributing System. Issued to H. P. Clausen, Rochester, N. Y., assignor to Western Electric Company, Chicago, Ill. The connecting operators sit in front of a blank multiple; all the line lamps are grouped before distributing operators who have no answering equipment. When a line lamp glows, the distributing operator calls the number over an order circuit to a connecting operator, who picks it up in the multiple and gives the desired connection in the usual manner.

1,133,291. Selector. Issued to E. E. Kleinschmidt, New York, N. Y., assignor to Hall Switch & Signal Company, New York, N. Y. The stepping selector has a condenser in series with its actuating coil and is responsive to alternating current only, while the signal bell is responsive to direct current only. The proper number of alternations followed by a continuous current will ring the desired bell.

1,133,373. Call Sender for Automatic Telephone. Issued to John Erickson, Chicago, Ill., assignor to First Trust and Savings Bank, Trustee, Chicago, Ill. (Application filed November 12, 1906.) In a call sender of the Strowger type, the dial in returning sends the impulses for the vertical or selective action at the central office, and the "rotary" impulse for the side switch is then sent by the action of pulling down the dial for the next figure.

1,133,449. Multi-Contact Relay. Issued to Harry G. Webster, Chicago, Ill. The fixed points are arranged like the points in the jackfield of an automatic selecting switch,



1,133,955.

and the armature carries a set of brushes, moving vertically between the fixed points.

1,133,549. Party-Line Cutout. Issued to William B. Francis, Prague, Okla. The switch lever lifts when the receiver is removed, and then may be moved to right or left. An intermediate station upon a party line may listen upon the line, then cut off the line in either direction and speak or ring upon it in the other direction.

1,133,750. Induction Coil. Issued to Thomas Shaw, Hackensack, N. J., assignor to American Telephone & Telegraph Company, New York, N. Y. A reflection-reducing transformer for loaded lines. A toroidal core has speaking conductors in pairs, and an added single conductor upon the same core.

1,133,786. Mutiple-Contact Relay. Issued to Garrison Babcock, Rochester, N. Y., assignor to Frederick C. Stevens, Attica, N. Y. Some of the contact springs are mounted with their edges vertically and some horizontally, and the armature controls their mutual engagements.

1,133,787. Relay. Issued to Garrison Babcock, Chicago, Ill., assignor to Frederick Stevens, Attica, N. Y. The numerous springs of this relay are set crosswise of the core, and the pole piece for the armature is placed at the middle point of the core.

1,133,796. Call Sender for Automatic System. Issued to John Erickson, Chicago, Ill., assignor to Automatic Electric Company, Chicago, Ill. A Strowger call sender so arranged with a dial wheel and an impulse sending wheel that when the dial has been pulled the impulse sending wheel returns first and the dial afterward.

1,133,833. Head Telephone Support. Charles Adams-Randall, Boston, Mass., assignor to National Shawmut Bank, Boston, Mass., trustee. Upon the headband is a vertically adjustable bracket and upon the bracket the receiver is mounted with a universal joint.

1,133,923. Repeater System. Issued to Sidney George Brown, London, England. In a repeater system having voice relays for repeating in either direction alternatively, the inventor provides signal relays responsive to voice currents. The voice currents from the speaking station operate the signal relay to change the circuits at the repeating station to repeat and amplify the speech currents in proper direction.

1,134,059. Loud-Speaking Receiver System. Issued to Miles E. Pearson, Seattle, Wash., assignor to Universal High Power Telephone Company, Seattle, Wash. A double receiver operates two differential microphones, which in turn control a local circuit to a loud-speaking receiver.

A. T. & T. on Government Ownership

N. C. Kingsbury, vice-president of the American Telephone & Telegraph Company, in an address on the subject of "Publicity," before the Telephone Society of New York, at the United Engineers' Building, discussed briefly the attitude of the Bell System toward the question of government ownership of the telephone. Mr. Kingsbury was the representative of his company in the negotiations with United States Attorney General J. C. McReynolds in 1913, which resulted in the voluntary separation of the Western Union Telegraph Company and the American Telephone & Telegraph Company.

Mr. Kingsbury said in part that a good deal has been said recently in regard to government ownership of the telephone and telegraph. "We do not believe it is our duty as a corporation either to champion that plan or to violently oppose it. When the people of this country decide that it is their wish that the Government of the United States own the telephone and telegraph, then the Government of the United States will own them—there is no doubt about that. We do not intend to set ourselves up in opposition to the expressed wish of the people—that is not our plan nor our policy—but we are going this far: It is our policy to present the salient facts. We do believe it is our duty to let the people of this country know just what is involved in the proposition of government ownership.

"There are no secrets in our business. The annual reports of Mr. Vail have kept nothing back. Investigation could reveal nothing beyond what he has voluntarily published. He has sought to let the public know just what our business means when viewed as a whole; what purposes it seeks to realize; what prospects for adding to human comfort, convenience and happiness it holds out."

Of Interest to the Trade

What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

People of Tampa Welcome Automatic

At 11:40 p. m., Saturday, April 3, the automatic telephone system, manufactured and installed by Automatic Electric Company for the Peninsular Telephone Company of Tampa, Fla., was cut in service, completely supplanting the manual equipment formerly operated in that city.

By 12 o'clock midnight, 20 minutes after the cut-over started, every one of the 5,533 telephones in the Tampa system was connected through. The following day (Sunday) the calling was abnormally heavy, due to the great number of "trials" of the new system made by the subscribers. On Monday the volume of traffic was also very great, partly due to patrons familiarizing themselves with the service, and also because of the very large number of calls made for information as to the progress of the Johnson - Willard fight in Havana.

W. G. Brorein, President and General Manager Peninsular Telephone Co.

Despite these handicaps, however, the behavior of the automatic equipment was admirable, and the service from the first has proved entirely satisfactory to the officials of the Peninsular Company, and also to the public.

The installation consists of 3,350 lines of central office equipment of the standard type, giving individual, two-party, four-party and p. b. x. service. The apparatus is located in the company's new building in Zack street and in a branch exchange located in West Tampa, which was formerly operated as a semi-automatic district station in connection with the manual system, but has been changed to full automatic as a part of the general rehabilitation of the company's system.

The new exchange building is a four-story brick and reinforced concrete structure, and thoroughly up to date in every respect. On the first floor are located the general offices of the company. The office of W. G. Brorein, president and general manager since the formation of the company in 1901, is on the second floor, together with the long distance operating room and the drafting and accounting departments. The third floor is occupied by the automatic equipment and the men's recreation room and library. The fourth floor is not at present needed by the company and has been leased as a lodge hall.

The opening of automatic service was celebrated by a banquet held at the company's building Monday evening, April 5. About 300 guests, including the principal officials of the city and its leading business men, were present. Among the guests of honor were the directors of the Peninsular Telephone Company, including R. H. Goeke of Tampa; O. E. Dunan of St. Marys, O.; Earle L. Peters of Toledo, O.; De Forest Hicks of New York City, and Winfield Hauss of Wapakoneta, O., and H. A. Harris, who represented Automatic Electric Company.

A very unique program, in which the telephone was featured in many novel ways, was conducted by the Rotary Club. A number of speeches were delivered, in all of which the progressiveness of the Peninsular Telephone Company in adopting automatic equipment and the city's pride in having a thoroughly modern system, were particularly dwelt upon and general satisfaction with the new service was expressed. In fact, Mr. Brorein was kept busy all day Monday listening to the commendations of subscribers who had tried the dial and found it good.

At the conclusion of this part of the program the Hon. S. A. Hopkins of Columbus, O., vice-president of the Peninsular Telephone Company, made a brief speech in which he complimented President Brorein upon his able conduct of the company's affairs, expressed the willingness of the directors and stockholders to leave the business entirely in his hands, and presented him with a silver loving cup as an expression of the company's appreciation of Mr. Brorein's services.

In reply Mr. Brorein voiced his deep appreciation of the many compliments paid him, but declared that

New Building of the Peninsular Telephone Company, Tampa, Fla.

the work accomplished in Tampa had not been his alone, but had been shared in by every employe of the company.

In addition to the Tampa system, the Peninsular Company operates exchanges in Bradentown, Palmetto, Sarasota, Bartow, Lakeland, Plant City, Port Tampa City, Clearwater, Tarpon Springs and Mulberry, together with 100 toll stations. It operates 900 miles of metallic long distance lines in central and southern Florida, and

is connected with all points in Georgia, Alabama, Florida and North and South Carolina. The latest directory, that of March 1, 1915, shows a total of 9,769 stations served by this company, 5,533 of which are in the city of Tampa.

The present officers of the Peninsular Telephone Company are: President and general manager, W. G. Brorein; vice-president, Hon. S. A. Hoskins of Columbus, O., and secretary, R. H. Goeke.

Western Electric Exhibit at the Exposition

A gigantic desk telephone, fifteen times the size of the familiar instrument of everyday use, is the central figure of the Western Electric exhibit at the Panama-Pacific International Exposition.

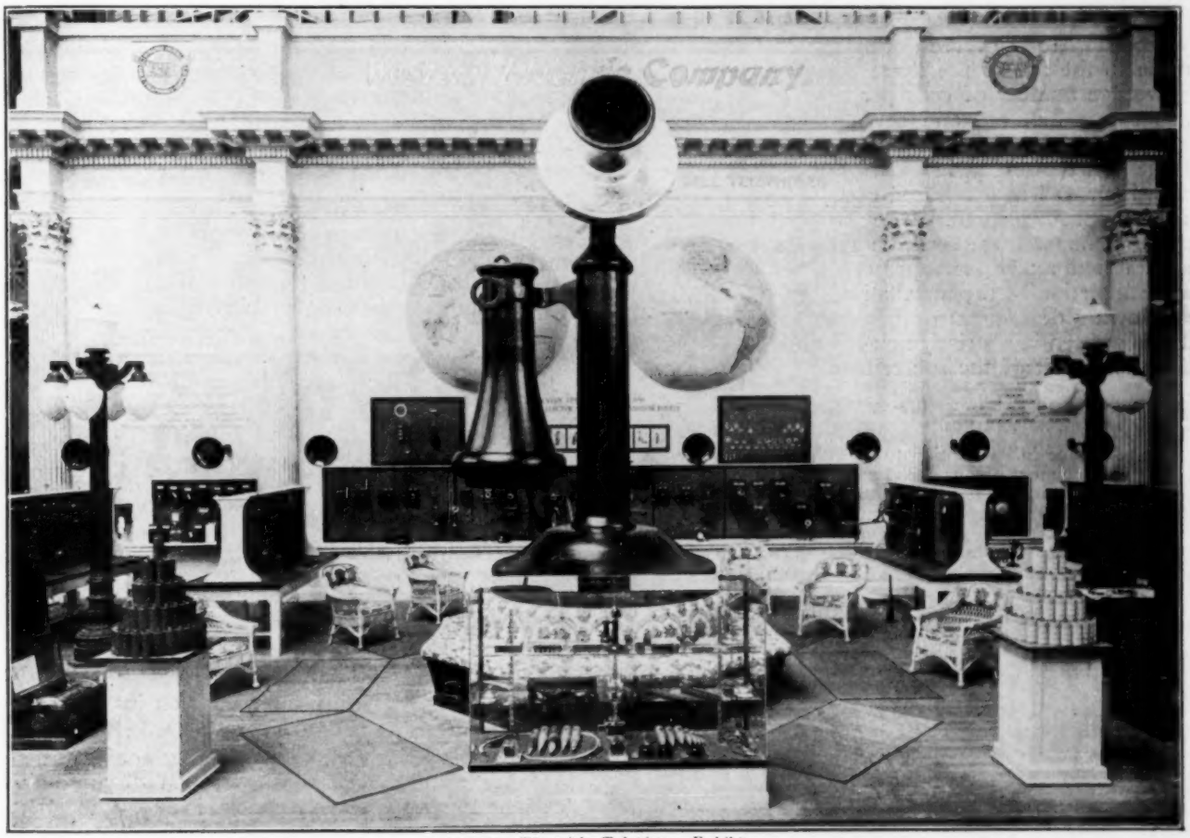
The architecture of the booth, which covers a floor area of 3,000 square feet, is novel and different from the usual type. The central section is open overhead, and on the back facade, in addition to a list of the forty-nine cities throughout the world in which the Western Electric Company maintains offices, and a list of its principal classes of products, are large reproductions of the Eastern and Western Hemispheres on which the forty-nine principal cities in which the company maintains offices are marked with miniature electric lamps which flash every twelve seconds which is the present rate at which a telephone is turned out from the Hawthorne main factory at Chicago.

The large desk telephone, mentioned as forming the central figure of the booth, has, built around its base, a comfortable and luxuriously-upholstered seat or lounge for the convenience and comfort of the foot-weary guests.

At either side of the central section the booth takes the form of pergolas in which various specialties are exhibited.

The color scheme is cream with green lattice-work on the pergolas.

On exhibit are vacuum cleaners ranging from a small cleaner, designed for use in apartments or a small house and which the housewife can hang away on a hook in the closet when she has finished the morning cleaning, to large stationary cleaners designed for use in hotels, office buildings, large residences, department stores, etc. There are also electric washing and wringing machines; electric ranges in and on which the baking, boiling, frying, etc., of the small family or the largest restaurant can be easily, quickly and economically done, without smoke or flame; electric irons, toasters, cooking utensils, etc.; Sunbeam Mazda lamps in all conceivable shapes and candle powers; electric motors and electric lighting plants all completely contained on one base and intended for the farm or residence out of reach of the city or town electric wires.



Western Electric's Telephone Exhibit.

In addition to these specialties and many others, such as electric fans, electric dishwashing machines, bells, annunciators, pole line material, etc., there is a large and comprehensive display of telephone equipment, for which the company is especially noted, including telephone apparatus for dispatching railway trains, for use in mines, in regular exchange service and also for inter-communicating or private telephone systems; also, telephone switchboards of different styles and sizes and adapted for different classes of service.

One of the special features of this exhibit is a practical demonstration of the company's recently perfected

loud speaking telephone equipment which is particularly adapted for announcing in railway stations, announcing in baseball parks, paging guests in hotels, etc. Eight of these instruments are installed.

High Point Rehabilitation

A. S. Hallstrom, southern representative of the Kellogg Switchboard & Supply Company, writes: "You will recall my having written regarding the automatic ringing, listening and instantaneous recall equipment installed by the North State Telephone Company of this town. This apparatus has been in service six months and is working to perfection. Where it was necessary heretofore to use six local operators during the entire day and one additional during the busy hours, it is now only necessary to use three during the day and a 'relief' to come to the aid of the three during the busy hours. The average number of calls per hour at the busy time is about two hundred and seventy-eight per operator. This equipment was installed by Mr. Hayden, on a series multiple jack cut-off switchboard. The service here is greatly improved at a reduced cost. Patrons and operators are much pleased. The necessary cord circuit relays are mounted on separate relay racks on the top of sections and really do not present an unsightly addition. Upon completion of the installation, Mr. Hayden mailed the following description of the system. You will note that it is written in a strictly non-technical way—purposely for the benefit of the subscribers:

DESCRIPTION OF THE KELLOGG SEMI-AUTOMATIC TELEPHONE SYSTEM NOW IN USE BY THE NORTH STATE TELEPHONE COMPANY

The telephone in its relation to the public may be considered the most vital element of our social and commercial development.

There are various methods of connecting two telephone stations together for the purpose of conversation.

Realizing that the most rapid and reliable method of establishing connection is contributory to satisfying the subscriber, we, after full investigation, have installed a system with the following new accomplishments.

Automatic listening, automatic ringing with indication, instantaneous recall, secret service, automatic peg count, etc.

This system is different. Read these instructions carefully so you can get the full benefit of the new improvements. Remember, the operator only connects you with the number you call. The automatic devices then do the ringing and watch your every want with unerring precision.

The instant you lift your receiver from the hook an electric light, with your number on it shows up at the switchboard. Any one of three or more operators can answer the call. The first operator who takes up your call is automatically connected with your line and takes your order. When she connects you with the number you have called, she is automatically cut out.

The "instantaneous recall" is the most valuable feature of the new service. It entirely does away with all working of the receiver hook and delay in making a number of calls in succession. After you have called one party and wish to call another, depress the hook once and release it instantly, and the operator will answer without fail. If you have answered your phone and find that another party at your place is wanted, hang up the receiver and send the desired party to the phone. He will find that the conncetion has not been disturbed, provided the calling party is waiting. If you have answered your phone and wish to make a new call immediately, it is only necessary to have the party who called you hang up his receiver, as the calling party controls the connection.

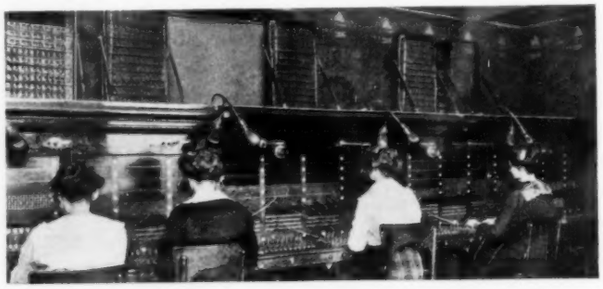
With "automatic listening": First, the operator cannot take up your call until she is ready to wait on you, thus giving some idle operator a chance to take the call. Second, the operator taking your call can serve you more quickly, as it is no longer necessary to operate a number of keys by hand. Third, the operator cannot leave you until she has connected you with the number you have called, and there is no possibility of your call being neglected. Do not work the receiver hook a number of times nor ask the operators questions. Both of these practices result in a loss of your time and also impede the service. When you call the operator, ask for some number, for Chief Operator, for Long Distance, or for time of day. For any other information, ask for Information Operator.

"Secret Service": The operator has no listening key and therefore cannot listen to your conversation in the usual way.

"Automatic Ringing": As soon as you are connected with the line you have called, if this line is not busy, your party's bell will ring. If it is not answered promptly, it will ring again, and continues to ring one second out of every nine until it is answered. You will distinctly hear every ring in your own receiver. When you are satisfied that the bell has rung sufficiently, you can hang up or make a recall for another number. The great advantage in this machine ringing and "automatic indication" is that the operator is not involved, but that you alone have absolute control of the ringing. Without the least effort you ring the party you are calling, as long as you please. Another advantage is that you get quicker responses because in every case the bell is rung correctly. Also, it is a great relief not to be annoyed by the operator coming in on the line and asking you about ringing again. In this system the operator has nothing whatever to do with the ringing. The machinery is so constructed that it will not ring in on a busy line, nor in one's ear. The best of operators often make mistakes in ringing and it is very satisfying to know that there is no danger of being "shot" in the ear.

Kellogg at Harrisburg

C. M. Thompson, Pennsylvania representative of the Kellogg Switchboard and Supply Company, planned an especially interesting exhibit for the meeting of the Pennsylvania Telephone Association held at Harrisburg, Pennsylvania, in the Cumberland Valley Telephone Company building. The big three position instantaneous recall switchboard, a magneto switchboard and the Kellogg Universal switchboard, demonstrating equipment in private branch exchange form were on display; also the Kellogg apparatus display panels, including magneto and common battery telephone equipment. In order to be assured that every Pennsylvania telephone man who planned attending the meeting would know that a comprehensive and valuable exhibit was being arranged for his convenience and pleasure, Mr. Thompson had issued a letter, enclosing an illustration of one of the well-known Kellogg instantaneous recall board exchanges—photographs taken before and after the installation of this efficient equipment. This circular and letter was followed up with postal cards in two colors as further reminders.



A Kellogg Instantaneous Recall Board Installation.

Kellogg men in attendance were: C. M. Thompson, representative in charge of the exhibit; J. B. Edwards, general manager and vice-president of the Kellogg Company; A. J. Carter, general sales manager; C. D. Boyd, sales engineer, and M. B. Stazek, engineer.

As it was a joint gathering of the Eastern Pennsylvania and Western Pennsylvania Telephone Associations, there was an unusually large attendance.

Stromberg at the Harrisburg Convention

The Stromberg-Carlson Telephone Manufacturing Company, Rochester, New York, had a very interesting and attractive exhibit at the combined convention of the Eastern and Western Pennsylvania Independent Telephone Associations which was held at Harrisburg, Pa., on April 7 and 8.

The company's exhibit of "Quality apparatus" included several panels of standard telephones, multiple and non-multiple apparatus trays mounted on a neat display table of suitable design. On two of the panels the central energy telephones of various types were displayed, each instrument being arranged so that it could be easily examined. On the third panel the No. 896 compact wall instrument was mounted with the individual parts, thus enabling the visitors to examine every detail of the construction.

Parts that enter into the construction of multiple, private branch exchange and magneto switchboards were kept in felt-lined trays with recessed spaces shaped to accommodate each part. These parts, merely resting in their respective places, could be easily removed for inspection.

D. W. Brown, who had charge of the company's exhibit, stated that the convention was a success from every standpoint and that he had secured some good orders for Inter-Comm-Phone systems.

New Stromberg-Carlson Bulletin

The Stromberg-Carlson Telephone Manufacturing Company of Rochester, New York, has a new bulletin ready for distribution which covers its complete line of central energy telephones. The bulletin is gotten up in loose leaf form and is printed on a tough, serviceable paper which will stand the wear and tear of frequent handling.

Each telephone is treated separately, a brief description being given which is illustrated by an open and closed view of the instrument. The illustrations are such that all the details of construction can be easily seen. A diagrammatical view and circuit diagram of each instrument is also shown. On the diagrammatical views are listed the code numbers and piece numbers of the various parts which are used in the general assembly.

Last, but not the least, is the cover. This is of a dark gray cover paper on which is vividly portrayed a young lady using the company's latest No. 9 combination telephone, which is so rapidly making its way to the front in the telephone field.

Any telephone company that would like to obtain a copy of this new bulletin should drop a line to that effect to the advertising department of the Stromberg-Carlson company. The company will gladly send one by return mail.

Increases in Canada

An encouraging note is struck in this issue of *Telephone Talk*, the magazine published by the British Columbia Telephone Company. It points out that net increases in the number of subscribers took place in March, as compared with February, in Vancouver and Victoria, as well as in several of the smaller exchanges of the company. A net gain is also noted for the province as a whole. This would indicate that the province has resumed its forward march.

That steady expansion is expected is further shown by the announcement that the telephone company has in hand estimates of $32,796 in Vancouver $1,790 in North Vancouver; $22,145 in Victoria, and $5,750 in Nanaimo, as well as improvements in hand at Courtenay and Ladysmith. During the past few months the B. C. Telephone Company has been perfecting its equipment wherever tests showed that improvement could be made and also has been doing work on many of its exchange buildings so that everything will be maintained at that point of excellence for which the company strives.

Reorganization of U. S. L. Co. Assured

In the proceedings before Judge Hazel of the U. S. District Court of the western district of New York in Buffalo March 30 the receivers announced to the court that a complete re-organization of the United States Light and Heating Company is now assured through the efforts of the stockholders' protective committee. It appears that the latter represent over $2,00,000 of the $2,500,000 outstanding preferred stock and about $6,000,000 common stock giving them the majority control. The application of the receivers was for the purpose of advising Judge Hazel to wind up the receivership and transfer the business and the property to the re-organized company.

It is understood that necessary notification to the stockholders and others will take some little time and it appears, therefore, that the receivership wil be discontinued some time in June. In the meantime, the business will be conducted without interruption under the same operating management as heretofore, and the prospects for a large volume of business seem unusually bright. The mammoth plant at Niagara Falls has been doing a larger volume of business during the present month than for a year past, and orders booked for future deliveries are considered satisfactory.

Factory Struck by Lightning

A fire, caused by a bolt of lightning, damaged the Canadian Machine Telephone Company, Limited, 18-20 Duncan street, Toronto, to the extent of $40,000 April 26. The contents of the building are damaged to the extent of $35,000 and the building to the extent of $5,000. Both losses are fully covered by insurance held by ten companies.

The watchman of the building stated that he was ringing the clock on the ground floor when he suddenly heard a terrific crash followed by a smell of smoke. Running to the third floor he discovered the west corner of the building in flames. The telephone was disconnected owing to the storm and he was forced to run to the corner to turn in the alarm.

All the stock of telephone instruments on the third floor of the building were destroyed, and those on the second floor were severely damaged by water. All the instruments on the ground floor were saved.

The Carbo Steel Post Company has a factory at Chicago Heights, Ill.; main office, Rand-McNally building, Chicago; and has just broken ground for a new plant at Cambridge, Ohio. This speaks well for the merits of the company's patented products consisting, mainly, of field fence posts for farmers, fence posts for home owners, lighting and power transmission poles, also anchors and augers of various kinds.

Automatic System for Great Northern

A complete intercommunicating automatic telephone system, comprising more than 2,500 instruments and three automatic exchanges, will be installed in the office of the Great Northern Railway Company. A contract with the Tri-State Telephone Company for this service has been announced by Great Northern officials at St. Paul, Minn.

The installation of the new system will begin at once, with an automatic switchboard in the present general office building of the railway company. On this switchboard there will be 190 automatic telephones. When the offices are moved into the new general office building in St. Paul a complete switchboard will be installed as the center of a system of 1,000 instruments in the city.

Included in the automatic circuit will be the offices of the Great Northern Express Company and all outlying offices.

The St. Paul system will be connected with the Minneapolis system by a "tie" line, and both systems will be connected with an automatic switchboard at Superior, Wis., by a similar "tie" line. Eighty-five instruments will constitute the first installation in Minneapolis. The Minneapolis switchboard will be in the Great Northern passenger station, with an auxiliary board at the Minneapolis city ticket office. Forty-five automatic telephones will be installed at Superior.

Iowa Bill Has Objectionable Features

The passing by the Iowa Senate of a special bill will give cities of less than 40,000 population power to regulate all of their public utilities. This measure gives certain cities, including Keokuk, the right to regulate the service and the rates of telephones. This feature is approved by the Keokuk commissioners, but they find serious objections to the bill if passed in the original form as drafted, a copy of which was recently received by the city.

It contains a provision that any twenty-five freeholders of a city who are dissatisfied with the franchise and rates granted by the council may take an appeal to the district court, where the whole matter is to be gone over again and possibly the action of the city government nullified. Such an action would be a proceeding in equity under the law. The matter of whether rates and service is reasonable is virtually vested in the district court judges. The Keokuk commissioners say this conferring of that power is usurping the rights of the city government and making a municipal administrative officer of the district court judge, which they find to be objectionable.

An appeal may be taken from the findings of the district court to the supreme court of the state.

Magneto Number of "Telephone Facts"

The April issue of the Kellogg Switchboard and Supply Company's house paper, *Telephone Facts*, is now being distributed to the trade. This issue is entitled the "Magneto Telephone Number" and has several special articles on this type instrument, and its significance in modern telephone practice.

The cover ilustration shows a kindly old veteran of the soil getting the latest market reports. The mere presence of the telephone indicates the business farmer as it is now indisputable that the "farm without a telephone" loses a big per cent from a financial standpoint, loses much of its efficiency.

The May number of *Telephone Facts* will be on the magneto switchboard and *Facts* readers may expect some very interesting and helpful articles in this issue.

In Ghilan and Mazanderan, Persia, the telephone lines belong to the Hadji Mehdi Agha Company, whereas in the remaining Persian provinces they are the property of the Société Anonyme des Telephones Persans. There is telephone service in Teheran, Tabriz, Meshed, Urumia, Maragha, Hamadan, Kermanshah, Kasvin, Ispahan, Shiraz, Resht, and Bushire. The company holding the road concessions from Julfa to Tabriz and from Enzeli to Teheran has built a telephone along these roads for its exclusive use. The Société des Pêcheries Lyanazoff has installed a telephone line for the length of the shore between Bender-Gez and Gomouch-Tépé on the Caspian Sea. The Anglo-Persian Oil Company has built a private line from the oil wells at Madji Soleiman, Abaden, to the company's refineries on the banks of the Chat-el-Arab. A private line, joining Urumia with the lake of that name, has been recently built, and has been placed at the disposition of the public on the payment of $0.16 per message.

Portable Fire Vulcanizer

The Corbett & De Coursey Company, Pittsburgh, Pa., has brought out a portable electric vulcanizer to operate on a six-volt storage battery with which practically every automobile is equipped. It is furnished complete with six feet of flexible reinforced cord and a bayonet type plug which may be attached to the exploring or regular lamp socket and the vulcanizer costs nothing to use as it takes less current to operate than does the actual lighting of the car.

The report of the director general of the Siamese Posts and Telegraphs gives the following data in regard to the telephone service in Siam: There are 3 telephone exchanges in the Kingdom of Siam, 756 private telephones, and 8 public call stations in Bangkok. The average number of connections made at the Bangkok exchange during 24 hours was 7,380. The length of the aerial cables is 96 kilometers (59.7 miles), river cable 1 kilometer (0.621 mile), and aerial wires 5,050 kilometers (3,137.9 miles). The total earnings for 1914 were $52,242, the expenditures $45,689, leaving a balance of $6,553.

The Board of Public Utilities Commissioners of the Philippine Islands recently ruled that the local telephone company must, upon completing repairs to telephones, get the certificate of the subscriber for whom the repairs are made, to the fact that the repairs are satisfactory to the subscriber. The company has been ordered to submit to the board prior to April 1, 1915, when the new order is to become effective, a card to be used for obtaining such certificates from subscribers.

The Type S Wheatstone bridge portable testing set is described by the Leeds and Northrup Company in an attractive folder.

A consulting electrical and signal engineering office has been opened by A. G. Shaver at Rooms 1640-1642 Transportation building, Chicago.

Telephones for Mine Rescue Work

Telephone communication between the advance or rescue party and the outside of the mine, in the case of mine accidents, is one of the features of the daily demonstration of the U. S. Bureau of Mines rescue crew conducted in connection with the exhibit of the bureau at the Panama-Pacific Exposition at San Francisco.

This exhibit is housed in the Palace of Mines and Minerals, and consists, primarily, of a model mine constructed under the floor of the building in which are installed on exhibit appliances, the use of which promote safety and efficiency in mine work.

One of the features of this exhibit is the daily rescue drill by a crew of four or five men under the personal supervision of Engineer Edward Steidel, who is in charge of the bureau's exhibit. Twice a day, in response to a telephone message to the effect that an explosion has occurred in the mine, the rescue crew, in its specially designed motor car, rushes through the exposition grounds and up to the entrance of the building, and after putting on oxygen helmet breathing apparatus and Western Electric mine rescue telephone apparatus, they go into a glass-walled room located on the main floor of the building. This room is filled with smoke and gas fumes. The crew demonstrate that they can actually breathe and work in the midst of smoke and poisonous gases.

They then go below into the mine and bring out a supposedly injured miner, to whom they administer "first aid" treatment.

All the time the rescue crew is in the smoke-filled room and in the mine they are in constant communication with the outside by means of the telephone equipment.

Each member of the rescue party wears strapped to his throat a small, specially designed transmitter and a watch case receiver strapped to his ear. This apparatus is connected with a coil of flexible wire, which is carried by the chief of the party on his belt, which pays out as the party advances. The other end of this wire terminates in telephone equipment worn by the person in charge of directing the rescue work at the rear or on the surface.

The reason for this special equipment is that a man wearing any of the different types of oxygen helmets which cover his mouth cannot use the ordinary type of telephone transmitter. The throat transmitter furnished transmits speech practically as well as the standard type of telephone instrument and is very small and light, and is provided with a soft rubber cup which assists in holding it firmly against the throat.

United States Bureau of Mines Rescue Corps With Telephones.

In the past, many losses of life have occurred to members of rescue parties which unquestionably could have been avoided if there had been some means of communicating with the rear to advise when in need of aid, which could easily have been given. Another feature of importance is that such an intimate and constant communication with another human being on the outside encourages the rescuer and prevents those sudden waves of overpowering fear which everyone is more or less subject to in times of great danger, particularly when in the darkness and alone.

The mine rescue telephone equipment demonstrated at the exposition satisfies this need.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES.

Bernard C. Groh, until recently plant engineer of Automatic Electric Company, Chicago, has accepted a position with the Tri-State Telephone and Telegraph Company with headquarters in St. Paul, Minn., as consulting engineer. He will have supervision over the rehabilitation work on buildings, cable plant and general additions incident to the changing of the Minneapolis and St. Paul systems to automatic operation. Mr. Groh has had wide experience in the duties incident to his new position, having devoted the past two years to the scientific planning of automatic telephone systems. During that time he studied numerous plants, and drew up and supervised the execution of specifications for extensions to existing systems and for changing manual exchanges to automatic. He has been in telephone work about seventeen years, entering the engineering department of the Michigan State Telephone Company at Detroit when about 20 years old, finally becoming assistant superintendent of equipment for the old Erie System under C. L. Boyce. He was also chief engineer for the Interstate Telephone Company of New Jersey, an independent company, and afterwards became associated with Dr. Hammond V. Hays of the A. T. & T. Co.'s engineering staff in Boston. As construction engineer and engineer in the field, he worked on long distance conduit construction in the vicinity of New York, and was later general plant inspector for the Central District and Printing Telegraph Company (Bell) at Pittsburgh under S. P. Grace. Mr. Groh was largely responsible for the standardization of the A. T. & T. construction specifications and methods, and among his construction accomplishments may be mentioned the building of independent telephone plants at Trenton and Atlantic City, N. J. In 1910 he became chief engineer of the Subway Telephone Construction Company in Chicago. When the automatic telephone system in Chicago was turned over to the Tunnel Company he became its assistant chief engineer, and after the formation of the Illinois Telephone and Telegraph Company became its chief engineer.

O. L. Remington, general manager of William McLean & Company, Melbourne, Australia, and H. P. McColl, engineer of the company, have just arrived in this country for an inspection and study of telephone materials and equipment. They will be at Hotel La Salle, Chicago, for a short time, working east from there through the industrial centers to New York and Boston, and thence to England.

W. Roy McCanne, general sales manager of the Stromberg Carlson Telephone Manufacturing Company of Rochester, New York, and Gilbert Gislason, assistant superintendent, were in Chicago on April 24 on business.

Ray O'Brien, chief clerk of the Telephone Bureau of the Department of Public Service, Chicago, stole a march on his friends on April 21, in annexing a young lady, Miss Elizabeth B. Gaynor, as his bride.

J. M. Carroll, for the past fifteen years in the employ of the Michigan State Telephone Company and the Southwestern Telephone & Telegraph Company, has purchased the Rogers Telephone Company of Texas.

George W. Conway, formerly district manager of the New England Telephone & Telegraph Company, has been appointed commercial superintendent of the Boston division, succeeding the late James A. Barry.

John F. Greenawalt, in charge of the public relations department of the Mountain States Telephone & Telegraph Company at Salt Lake City, Utah, has been appointed head of the general publicity and public relations departments of the Mountain States Telephone & Telegraph Company with headquarters at Denver, Colo.

J. N. Clem, who has been manager of the Cumberland Telephone & Telegraph Company's exchange at Jeffersonville, Ind., has been appointed manager of the company's exchanges at Charlestown, Henryville and Sellersburg.

George Gilliatt, a stockholder in the Pike County Telephone Company at Washington, Indiana, has been appointed manager, assuming his duties April 1.

At a meeting of the directors of the Chicago Telephone Company, held recently, B. E. Sunny was re-elected president of the company.

Fred Strobel was recently elected manager of the Moscow Telephone Company at Moscow, Idaho.

J. J. Carty, chief engineer of the American Telephone & Telegraph Company, was the guest at a dinner given recently by Past-President Gano Dunn of the American Institute of Electrical Engineers, at the University Club, New York.

H. J. Richardson, secretary of the Augusta Telephone Company, Augusta, Michigan, has resigned his position, William Drew being elected to fill the vacancy.

Joseph C. Davidson, right of way man for the Chicago Telephone Company on the north shore, died at his residence, 5327 Winthrop avenue, Chicago, on April 19.

S. P. Jordan, wire chief of the Iowa Telephone Company at Clinton, Iowa, has retired on a pension, having served the company thirty-four years.

J. B. Earle, president of the Texas Telephone Company at Waco, was married to Mrs. Louise Maddin Brown of Nashville, Tennessee, on April 11.

F. W. Slawson of Casselton, North Dakota, has been appointed manager of the North Dakota Independent Telephone Company at Bismarck, succeeding Clayton Dalrymple.

F. P. Valentine, who has been associated with the American Telephone & Telegraph Company in Boston, has been transferred to the commercial engineer's office of the same company in New York.

Fred Richards was recently appointed manager of the local telephone company at Wild Rose, Wisconsin, succeeding H. M. Frost.

Abraham C. Silberman, an advertising man for the Bell Telephone Company in Philadelphia, Pennsylvania, died at his residence in that city, April 15.

E. L. Farwell was recently elected general manager of the Delaware County Telephone Company at Manchester, Iowa, succeeding the late Charles A. Peterson.

President Clifford Thorne of the National Association of Railroad Commissioners has appointed Chairman C. A. Reynolds of the Washington Public Service Commission as chairman of the committee on telephone and telegraph rates. The committee is regarded as one of the most important of the association and the members of the committee, besides Mr. Reynolds, include: E. F. Coard, New York; J. M. Kinkel, Kansas; Howard D. Ogden, West Virginia; S. W. Pennypacker, Pennsylvania; Axel P. Ramstedt, Idaho, and Clinton White, Massachusetts.

NEWS FROM THE FIELD.

IDAHO.

Work of construction by the Mountain States Telephone & Telegraph on their new plant at Pocatello has been completed. This $85,000 plant is one of the best equipped telephone buildings in the West.

A franchise has been granted by the commissioners to the Bronx Farmers' Telephone Company to erect and operate a telephone line along the county road between Colburn and Ponderay.

At the annual stockholders' meeting of the Carey Telephone Company held recently at Carey the officers elected for the coming year are as follows: John R. Adamson, president; S. Parke Richards, vice-president; Arthur B. Case, secretary and treasurer.

ILLINOIS.

After the annual meeting of stockholders the board of directors of the Forreston Mutual Telephone Company of Forreston recently elected the following officers for the coming year: Hiram DeWall, president; Henry Zumdahl, secretary; Harm J. Evers, treasurer; Harm Meiners, purchasing agent, and Christ Gassmund, manager.

Star Telephone Company, Lively Grove township, Washington county, dissolved.

On February 26 the Chicago Telephone Company gave the city comptroller a check for $125,187.92. The payment covered the city's share of the company's receipts for the six months ending December 31.

Chicago Telephone Company, regular quarterly of $2, payable March 31 to stock of record March 30.

Chambersburg Telephone Exchange, Chambersburg; capital, $1,000; operate a telephone exchange; incorporators: E. B. Tolbert, H. A. Ham, F. D. Huber, Oscar Dennis.

The Rogers Park exchange of the Chicago Telephone

Company was cut into service March 6. The switch was turned by Mrs. C. H. King, president of the Rogers Park Women's Club.

The Beason Telephone Company, Beason; capital, $6,500; contracting, maintaining and operating telephone exchange; incorporators: George A. Curry, William B. Curry, B. Benjamin, S. Gordon, William E. McClelland.

A new switchboard will be placed in the 4-C Telephone Company of Paxton in the near future.

Sangamon County Telephone Company, Pawnee; directors increased from three to five.

Sheldon Farmers' Telephone Organization, Darrow; capital, $637; telephone purposes; incorporators: H. V. Crossland, Elrick, Mayotte, Albert James, Ross Keen.

Extensive repairs are being made by the Bell Telephone Company on their exchange at Wataga.

McConnell Telephone Exchange Company, McConnell; capital stock increased from $1,000 to $7,000.

The Inter-Township Telephone Company at Earlville has increased its capital stock from $20,000 to $30,000.

The Mississippi Valley Telephone Company at Warsaw have purchased the old bank building on Main street, near second, and same will be remodeled and used for exchange purposes.

The Seymour Telephone Company has decided to extend its lines for one mile across the Sanagamon river into Piatt county. This addition will make 28½ miles of service out of Seymour.

INDIANA.

North District School Telephone Company, Seymour; capital, $80; mutual telephone service; directors: Andy J. Frey, William Gocker, Mrs. Catherine Weber and others.

Articles of incorporation have been filed for the new Macy Telephone at Peru, with Thomas Savage, Mary Cloud and Otto Cloud as the incorporators. 150 shares of stock will be issued at the rate of $100 per share; 75 preferred and 75 common. The Macy system was formerly owned by L. E. Greenwood, who operated under the name of the Macy Telephone Exchange.

Mongo Mutual Telephone Company, Mongo; $5,000; to operate telephones and telephone lines; H. H. Keyes, J. J. Snyder, A. W. Gooden.

The Burlington Telephone Company, Burlington, Carroll county; $2,100; to operate a telephone exchange, etc.; S. D. Lowe, J. P. Haun, W. L. Butcher.

The Bell Telephone Company has completed a new circuit from Marion to Alexandria at an expense of several hundred dollars.

The People's Mutual Telephone Company, with centrals at Silver Lake, Mentone and Burket, has been sold to Messrs. Brody and Zimmer of Silver Lake, and hereafter it is understood Mr. Zimmer will manage the company.

At the annual meeting of the Pike County Telephone Company, held recently at Petersburg, plans for the enlargement and extension of the system were carefully discussed. The following officers were elected for the coming year: President, Robert M. Craig, Otwell; vice-president, H. H. Knipe, Olney, Ill.; secretary-treasurer, Frank J. Berger, Petersburg; general manager, Charles R. Head.

Elberfield and Phelps Telephone Company, Elberfield; capital, $150; to operate telephone lines; directors: Henry Briel, Theodore Gerichs, A. Fischer.

IOWA.

The annual meeting of the Farmers Mutual Telephone Company was held at Rudd recently. Officers elected are as follows: W. G. Hart, president; Warner Grey, vice-president; J. W. Cline, secretary; A. C. Meier, treasurer; directors: N. Poppen, Rockford; Warner Grey, Osage; G. F. Seaton, Floyd; Florinn Hofler, Nora Springs.

A fire in the telephone exchange at Greene recently completely destroyed the switchboard of the Shell Rock Valley Telephone Company.

Plans are now under way for the reconstruction of Decatur's telephone system.

At the annual meeting of the Bussey Mutual Telephone Company held recently the following officers were elected for the coming year: John Moore, president; W. H. Lowman, vice-president; E. C. McClure, secretary; John Sims, treasurer.

The Iowa Telephone Company is going to rebuild its lines in Osceola and build a toll line to Chariton. They have received a carload of cross arms, pins and braces, and work will begin immediately.

At the annual meeting of the Sac County Mutual Telephone Company, held recently at Odebolt, the following officers were elected for the coming year: President, John Fuchs; vice-president, Henry Frevert; secretary, E. E. Babcock; treasurer, Chris Huebner.

At a meeting held in Jefferson recently by the stockholders of the Citizens Mutual Telephone Company it was voted to buy a new switchboard and exchange plant, the cost of which will be $7,000.

The Crawford County Telephone Company's exchange at Denison is rapidly nearing completion.

A new switchboard is being installed in the local telephone exchange at Grundy.

After March 1st Ida Grove will have but one telephone company, the Ida County, which at a meeting arranged to take over the Farmers' Mutual Company, together with the Bell exchange.

The Farmers Telephone Company of Lakeview have moved into their new quarters in the post office building.

The Humeston Telephone Company, Humeston, has purchased from Dr. George McCulloch a strip of ground with a twenty-five foot frontage on which site a new telephone exchange will be built.

The Plainfield Telephone Company has purchased the M. W. Scott building at Plainfield and will convert same into a telephone office.

A new switchboard is being installed by the Citizens' Mutual Telephone Company in their exchange at Bloomfield.

The Ottumwa Telephone Company was granted permission to construct conduits on Church street, from the Market street bridge to Ward street, Ottumwa, at the meeting of the commissioners held March 17. The conduits for the telephone wires will be placed under the sidewalks.

KANSAS.

A new telephone exchange has been installed at Byers and at Iuka with M. W. Brown as manager of the new Byers-Iuka exchange.

At the directors' meeting of the Farmers Telephone Company held at Hillsdale recently the board voted to put in a toll line between LaCrosse and McCracken. Work on the new line will commence at once.

Extensive improvements are being made by the farmers of Laing township on their rural telephone lines.

The business men and farmers of Centralia and vicinity are organizing a mutual telephone company with sufficient capital to provide phone service for the town and country round about.

A new telephone line is being installed west of Vinland. The old line is being divided and several new members have taken shares.

A new telephone line has been built connecting residents of Gypsum township with the Bell Telephone exchange in Wichita.

The Farmers' Mutual Telephone Company has rented new office rooms at South Haven and the headquarters will now be in the upper story of the Stultz building.

KENTUCKY.

Hendricks Home Telephone Company, Hendricks; capital, $300; incorporators: Sam Arnett, C. H. Patrick, Beache Patrick and Wilson Arnett.

Farmers' Home Telephone Company, King; capital, $500; incorporators: James Golden, Oscar Foley and J. A. Leger.

The Ward City Telephone Company, Ward City; capital, $200; incorporators: J. W. Daniels, W. J. Ward, Woodson Joseph and John B. Wells.

Mansville Telephone Company, Mansville; changing name to Taylor County Telephone Company and increasing capital from $2,500 to $10,000.

King Telephone Company, King; capital, $250; incorporators: S. J. Mays, J. G. Evans, B. Pope and J. I. Hopper.

At a recent stockholders' and directors' meeting of the Nicholas Home Telephone Company of Carlisle, Mr. J. J. Veatch, district manager of the Central Home System, was elected vice-president of the company. Cable extensions and other improvements were authorized at the meeting, estimated to cost approximately $2,500 to $3,000.

L. C. Starks of Hardin is negotiating for the purchase of all the independent telephone lines in Marshall county.

LOUISIANA.

Residents of Vincent settlement, six miles south of Sulphur and the railroad, have organized a farmers' telephone company and practically all of the stock has already been subscribed. Tony Vincent is president of the concern, C. P. Elender secretary, and A. J. West treasurer.

A deal has been consummated whereby the Planters' Telephone Company acquires the exchange and all property of the Cumberland Telephone Company at Welsh.

MICHIGAN.

The telephone line around Sunfield, which was damaged by the recent storm, will be replaced this spring by an underground cable and 2½ miles of cable have already been ordered at a cost of $900.

Work is now under way on the extensive improvements to be made by the Bell Telephone Company in Jackson. Over 6,000 miles of new work will be installed and it is estimated the improvements will cost about $103,651.

Officials of the Michigan State Telephone Company announced recently that they would spend $50,000 in improvements in Kalamazoo, the greater portion to be used for extensions.

As a result of action now being taken by the Bell Telephone Company of Battle Creek, over 1,000 poles will be removed from the city streets within a very short time. The company is taking down its individual wires and putting them in cables in various parts of the city.

Arthur Von Schlegell, general manager of the Michigan State Telephone Company, has announced that automatic telephone ringers are to be installed in all Detroit exchanges.

Muskegon's new telephone system will be of automatic type, as was decided by the board of directors of the United Home Telephone Company. The new plan will be in readiness some time in September or October.

MINNESOTA.

The entire telephone system of Benton will be built this spring at an approximate cost of $5,000.

Numerous improvements are to be made this spring in the Blue Earth Valley Telephone Company's exchange at Elmore. The exchange will be moved into new quarters over the Farmers State Bank.

The Cobden Telephone Company of Cobden was recently purchased by Ed. Bertrand, who expects to make many improvements in the exchange.

At the annual stockholders' meeting of the People's Telephone Company of St. Charles, held recently, the following officers were elected: S. Burnap, president; H. Currie, vice-president; T. W. Pease, treasurer, and F. G. Stoudt, secretary.

Farmers of three townships, Buzzle, Roosevelt and Alaska, have organized what will be known as the Aure Farmers' Co-operative Telephone Association. The officers are: President, A. G. Gilbertson, of Pinewood; vice-president, George W. Curtis, of Aure; secretary, Charles Moller, of Pinewood; treasurer, A. A. Haarklan, of Pinewood.

The Marysburg Rural Telephone Line was organized recently at Madison Lake, with Isidore Clinton as president and J. M. McCarthy as secretary and treasurer. This new telephone system will connect with that of the Mankato Citizens' Telephone Company at Madison Lake.

Farmers of Bear River have perfected a rural telephone company, known as the Bear River Valley Telephone Company, to extend lines from either Hibbing or Chisholm to the residences in that section. G. F. Peterson was elected temporary president. Other temporary officers are: Arthur Brude, secretary, and Edward Pixley, treasurer.

A new cable has been laid from the Cannon Valley Telephone exchange to the Northwestern line, connecting on the pole south of the R. E. Stewart block, Waterville.

A school of instruction for chief and toll operators of the Tri-State Telephone Company was held for two days at the Hotel Winona, Winona, February 25, under the instruction of W. S. Vivian of Chicago, secretary of the Independent Telephone Association of America.

At a meeting of the directors of the New Ulm Rural Telephone Company, held recently, it was decided to erect a new exchange building.

M. C. Kronemann, William Schoening, Henry Kissinger and Herman Steinbach are among the organizers of the Fergus Falls Rural Telephone Company; capital, $2,400.

At the annual meetin of stockholders of the Mankato Citizens' Telephone Company held March 9 the following officers were re-elected for the coming year: President, H. A. Patterson; vice-president, Nic Peterson; secretary and treasurer, W. D. Willard; attorney, S. B. Wilson; manager, P. M. Ferguson.

L. H. Satterlee, formerly engaged in the telephone business at St. Peter, has taken charge of the Elmore Telephone Exchange.

MISSISSIPPI.

The Cumberland Telephone and Telegraph Company is making preparations to greatly improve its telephone system at Magnolia. The thirty-one miles of open wire which supply the local exchange will be enclosed in cables. The wires from the poles to the residences will be replaced by insulated wire, and the exchange switchboard will be thoroughly repaired and the entire system modernized.

Plans are under way by the Cumberland Telephone Company for the erection of a new building at Vicksburg, work to commence very shortly.

MISSOURI.

The Farmers' Mutual Telephone Company and the Neff County Telephone Company of Ridgeway recently consolidated.

The Kingston Telephone Exchange was recently purchased by Foster A. Crockett of Kingston at a cost of $8,000.

The Home Telephone Company's building at Independence was destroyed by fire recently. Workmen are busy removing part of the old Home Telephone Exchange at Joplin to this place.

The installing of the new switchboard of the Whitewater Telephone Company at Whitewater is almost completed.

Estimates and specifications for cable extensions in Springfield to cost between $40,000 and $50,000 have been approved by the general offices of the Missouri-Kansas Telephone Company, according to information received by R. G. Porter, district manager. Work on the extensions will be started immediately.

Many lines of the Farmers' Mutual Telephone Company of Burlington Junction were broken and torn from the poles during a recent storm.

At the annual meeting of the Adrain County Mutual Telephone Company, Mexico, held March 4, officers were elected as follows: President, Frank James; vice-president, Noble Barnes; directors: Val Ardel, Rush Hill and F. P. Martin, Auxvasse.

MONTANA.

The Bozeman-Pass Creek Telephone Company at its annual meeting held in Belgrade recently chose R. L. Frank to the board of directors. The directors then elected Mr. Frank president, Charles Cameron vice-president, and Glen Morgan general manager of the company.

At the annual meeting of the Meagher County Telephone Company of Harlowton, held recently, the following officers and directors were elected for the ensuing year: F. W. Barron, president and general manager; E. T. Barron, vice-president and treasurer; Benjamin Urner, secretary. The directors are: W. L. Ford of White Sulphur Springs, E. T. Barron of Roundup and Benjamin Urner, E. F. McQuitty and F. W. Barron of Harlowton.

Articles of incorporation have been filed by the Fife-Wayne Farmers' Telephone Company at Great Falls. The company is incorporated for $5,000 with incorporators and officers as follows: W. H. Porter and John H. Bogner, Wayne; Clark Baumgartner and J. M. Carlson, Fife, and John Sweeney, Belt.

A movement is under way to join under one management all the farmers' and mutual telephone lines between Simms and Vaughn.

Plans are now under way for the construction of a telephone line in Bitter Root Valley.

A permit has been issued to the Mountain States Telephone and Telegraph Company at Great Falls allowing certain alterations to be made on the interior of the company's building at 309 First avenue north. The cost of the alterations will be $1,000.

NEBRASKA.

All telephone lines operating from the headquarters of the Nebraska Telephone Company in Central City are again in operation, following the recent storm.

The farmers near Greenwood are organizing a stock company for the building of a local telephone line.

The Bell Telephone Company will rebuild their toll line between Creighton and Lynch this spring.

The new $300,000 exchange of the Lincoln Telephone and Telegraph Company at Hastings was opened to service February 12.

The Union Mutual Telephone Company of Union has bought the interests of the Lincoln Telephone & Telegraph Company in that territory and will consolidate the lines.

The telephone exchange at Traer was destroyed by fire.

The State Railway Commission in a hearing at Hastings recently allowed the Lincoln Telephone and Telegraph Company to discontinue its Inland exchange.

The East Table Telephone Company of Merna, Custer county, is a new corporation that has filed articles with the secretary of state. Its total issue of capital stock is $240. The shares are $20, and each person is allowed a single share. The corporate debt is limited by the articles to $96. Henry Jacobson is president and Mott Brandenburg secretary-treasurer.

At the annual meeting of the stockholders of the Milburn-Anselmo Telephone Company held recently at An-

selmo the following directors were elected: J. F. Alton, Frank Jacquot and Charles Blakeman.

At the annual meeting of the Blair Telephone Company, held January 12, the following officers were elected for the year: John Blaco, president; Frank Schafer, vice-president; Henry Rohwer, treasurer,; Stanley Gossard, secretary and manager.

The Lincoln Telephone and Telegraph Company of Lincoln January 15 paid the city an occupation tax of $282.11, being 1 per cent on the December income of $28,211.28.

NEVADA.

Announcement has been made by the Bell Telephone Company at Reno that all telephone wires in the business district of the city are to be placed underground. An expenditure of $25,000 to $30,000 will be required.

NEW MEXICO.

Mrs. Ethel Harper has purchased the telephone exchange at Roy.

NEW YORK.

The New York Telephone Company reports for the year ended December 31, 1914, net earnings of $10,159,046; total net, $16,175,741; balance to surplus, $2,715,754.

At the annual meeting of stockholders of the Southern Bell Telephone & Telegraph Company, held in New York, February 25, the following directors were elected: U. N. Bethell, N. C. Kingsbury, Theodore N. Vail, C. H. Wilson, George D. Milne, W. T. Gentry, J. Epps Brown. The directors then met and re-elected the following officers: W. T. Gentry, president; J. Epps Brown, first vice-president; J. M. B. Hoxsey, second vice-president and treasurer; Leland Hume, third vice-president; Hunt Chipley, general counsel; C. J. Hodlitch, general auditor; Addison Maupin, secretary and assistant treasurer.

A new telephone switchboard costing $7,000 has been installed in the New York Central Railroad's passenger station at Utica.

A new multiple, six-position information and order board has been installed at the offices of the New York Telephone Company in North Fitzhugh street at Rochester. Improvements have been made at the offices entailing an outlay of $500,000.

The New York Telephone Company announces the sale of its East Berne and Rensselaerville exchanges, with 300 subscribers, to J. L. Borst of East Berne.

The Bell Telephone Company of Binghamton has been cut over to its new home on Henry street. The structure is three stories and is absolutely fireproof, costing one-quarter million dollars.

A special stockholders' meeting of the American Telephone & Telegraph Company will be held March 29 in New York to decrease the number of directors.

A delegation, representing thirteen rural telephone companies with their attorney, John M. Parker, appeared March 9 before the Board of Trustees at Owego to ascertain its attitude in the matter of granting them a franchise to enter the village with their lines.

American Telephone and Telegraph Company, quarterly, $2, payable April 15.

A dividend of 3 per cent was declared by the stockholders of the York Telephone and Telegraph Company at their annual meeting held in the Exchange building, 31 S. Beaver street, York City, January 5. The following board of directors was chosen to serve for the ensuing year: Daniel F. Lafean, George B. Rudy, C. C. Frick, Dr. William S. Eisenhart, Harry S. Wiest and H. H. Weber.

A new cable is being put in at Henderson by the Home Telephone Company.

Work is progressing rapidly on the new building of the Bell Telephone Company of Jamestown and experts are installing the equipment. The building will be ready for occupancy early in March.

NEW JERSEY.

The work of rebuilding the entire village system of the Wayne Telephone Company at Newark has been completed. The new switchboard has been cut in and all wires in the business section have been placed underground and new poles and aerial cable have been placed all over town.

NEW MEXICO.

Ishmael Sparks, formerly proprietor of the Santa Fe telephone system and later in business in Gallup, has purchased the Socorro telephone system from Captain T. J. Matthews.

NORTH CAROLINA.

Plans are now under way for the construction of an immense cable to take care of one hundred additional stations at West Asheville by the Asheville Telephone and Telegraph Company.

The Home Telephone and Telegraph Company of Rocky Mount has opened a class at this exchange for the purpose of training operators.

Gates Telephone Company of Gatesville, with authorized capital stock of $15,000. Incorporators, Matthew Riddick, Jr., T. G. Hayes, J. W. Brown and others.

Interurban Telephone Company, of Asheville, with authorized capital stock of $30,000. Incorporators: L. L. Davenport, B. J. Downey, J. Henry Odom and others.

NORTH DAKOTA.

The farmers of Blue Grass recently held a meeting for the purpose of organizing the Blue Grass Farmers' Telephone Company.

Extensive improvements are being made in the telephone system at Hankinson.

The directors of the Rawson Telephone Company held a meeting recently at which it was decided to construct about thirty miles of line during the coming season.

The North Dakota Independent Telephone Company will rebuild its lines at Carrington in the spring. Cables will be substituted for the numerous wires.

At a meeting of farmers held at New Salem recently the Beaver Valley Farmers' Telephone Company was organized.

Plans are under way for the organization of a telephone line between Alta and Regan.

The business men of Alexander have formed a telephone organization and will assist the farmers of the vicinity to establish lines north and south of that town.

Malkus Ankerberg and Henry Bohrer have taken over the interests of the Stanton Telephone Company of Bismarck, which was formerly owned by A. J. Withnell.

Union Telephone Company of England, Hettinger county, capital stock, $10,000; incorporators: C. J. Herstein, George B. Bagley and E. J. Strand, all of New England. Filed February 24.

The Wildrose Mutual Telephone Company of Bismarck has ordered material for sixty-two miles of telephone wire to be put in this spring.

Cottonwood Lake, in Williams county, is now connected by telephone with Ray and Williston.

The North Dakota State Telephone Association will hold their convention at the Commercial Club, Grand Forks, on March 24 and 25.

The farmers north of Woodworth will build a telephone line from that town and running north for several miles.

The farmers of the vicinity of Palermo and Stady will build seventy miles of telephone line to connect with the two towns in the near future.

The Raleigh Telephone Company recently closed a deal for a parcel of ground on the corner of Hargett and Salisbury streets on which they propose at an early date to erect a three-story building.

Large forces of experienced workmen arrived at Asheville September 14 to begin the extension of the lines of the Asheville Telephone & Telegraph Company, which will be added to in such a manner as to care for this city's needs for several years to come. Approximately $30,000 will be spent in carrying on the work and the task is one that will require several weeks. A 20,000-foot cable has been brought here for use in connection with the work and a cable carrying 1,200 wires underground is being laid underground from the exchange.

The Hannover telephone line is soon to be an added attachment to Center, coming in over the Spring Brook line. The line is being put up in a very substantial manner and has a considerable number of subscribers.

Lone Tree Telephone Company, Sheyenne, Eddy county; capital stock, $2,000; incorporators, J. H. Kennedy, M. A. Erickson and R. H. Nyland, all of Sheyenne, N. D.

The Independent Telephone Company has completed the work of installing the telephone system at Hazen, Beulah and Zap, and the line will be into Golden Valley within a very short time.

Hannover Mutual Telephone Company, Hannover, Oliver county; capital stock, $2,700; incorporators, C. Zunn Mallen, John H. Albers and Fred Wilkens, all of Hannover. Filed December 26.

The local telephone company at Wohord has installed an up-to-date switchboard.

A new telephone line has been constructed from Bisbee to Rock Lake.

Stanton, in Mercer county, is now connected with Pleasant Valley by telephone.

Telephone service to Kildeer will be given by February 1, according to the plans of the North Dakota Independent Telephone Company.

SOUTH DAKOTA.

The negotiations by which the Potter County Telephone Company contemplated a deal with the Dakota Central Company to take over the central office business at Gettysburg and Lebanon have been closed and the new arrangement became effective August 1. Poles, lines and other equipment of the Dakota Central Company at both places have also been purchased by the Potter county company.

The Dakota Central Telephone Company is stringing a copper toll line between Ellendale and Aberdeen. The building of this line will enable patrons of the company to have a direct toll line to Minneapolis.

At the annual meeting of the Cheyenne River Telephone Company at Buffalo Gap held recently the following officers were elected for the year 1915: President, Charles Peterson; vice-president, J. L. Maxson; secretary-treasurer, Geo. Havens; directors, Custer Division, A. Sanson; Lame Johnny, August Miller; French Creek, Theo. Rassmussen; Cheyenne River, Tom Wilson; Buffalo Gap, Chas. Stabler.

The farmers in the territory north of Gregory recently organized a rural telephone company and now are engaged in constructing the line, which will have connection with the Gregory system.

The Osceola Telephone Company held its annual meeting January 8 at Osceola and elected the following officers: Chairman, Lou Meyer; clerk, P. B. Houghton; treasurer, J. S. Schneller; directors, C. Estergard, Fred Derscheid, Fred Rusch and Lou Meyer.

OHIO.

The Mansfield Telephone Company has placed its order for equipment for 160 additional lines on its switchboards, made necessary by steadily increasing business.

The Middlepoint Home Telephone Company, Middlepoint, increase $6,000 to $25,000.

The Cleveland Telephone Company has requested permission of the state public utilities commission to change the practice of billing subscribers' exchange rental charges from quarterly to monthly. If the commission approves, the change will be effective April 1.

The Northwestern Telephone Company, Defiance; $100,000 to $150,000.

The Ohio State Telephone Company, through its executive committee in Columbus, March 4, has announced that it will expend $235,630 in additions and improvements to its plants in Youngstown, Dayton, Washington C. H. and Cleveland immediately. It will spend $16,000 for a new exchange at Youngstown, $20,256 for a sub-exchange in Dayton, $22,000 for automatic equipment at Washington C. H., and the remainder on a West Side exchange in Cleveland, and new equipment between Cleveland and Elyria.

Charles Y. McVey, vice-president and general manager of the Ohio State Telephone Company, has announced that the company is now planning installation of two more West Side exchanges in Cleveland that will cost over half a million dollars fully equipped. One of the new exchanges will be located on the north side of Lorain avenue, east of West 65th street, on a site 60x135 feet; the other is to be installed in Lakewood on a site not yet selected.

The Wilkesville Independent Telephone Company, Thurman, $3,000, J. O. Williams.

At the annual meeting of stockholders of the Lima Telephone Company held March 13 at the company's building on South Elizabeth street the stockholders and visitors were shown the operation of the new auto-manual system. The following officers and directors were elected for the coming year: D. J. Cable, president; S. S. Wheeler, vice-president; W. H. Duffield, treasurer; Henry Deisel, Sr., Alonzo Burt, M. J. Carney, C. H. Cory, J. B. Kerr, A. J. Mellen, J. R. Sinclair and C. F. Stolzenbach.

At the annual stockholders' meeting of the fflin and Widowville Telephone Company at Mifflin January 2 M. E. Gongwer and Samuel Applegate were re-elected directors for a term of three years.

An immense cable is being put up along East Crawford street at Findlay by the Central Union Telephone Company.

The Cincinnati and Suburban Bell Telephone Company, the successor of the Cincinnati and Suburban Telephone Association, filed a bond with the director of public service December 30 in the sum of $50,000 for the faithful carrying out of its franchise. Secretary Johnson states the Cincinnati Traction Company and the Union Gas and Electric Company will file their bonds soon after the first of the year. The American Surety Company is on the bond of the Telephone Company.

OKLAHOMA.

The German Rural Telephone Company, Enid; capital stock, $200. Incorporators: Franz A. Martens, H. F. Penher and P. Goosen, all of Enid.

The corporation commission has made an order directing thePioneer Telephone Company, Oklahoma City, to make connection with the Deer Creek Mutual Telephone Company at Arapaho for the purpose of transmitting long distance messages, the order becoming effective January 15.

The annual meeting of the Garfield County Rural Telephone Company was held January 11 at Enid and the following officers were elected for the year 1915: B. T. Stebbins of Breckinridge, Roy Walters of Covington, L. G. Hatfield of Barr, J. T. Bilderbeck of Carrier, David Stevens of Fairmont, James Wilson of Drummond, J. M. Dereamer, M. Mauk and Charles Pugh.

PENNSYLVANIA.

The charter of the South Annville Rural Telephone Company, signed by Former Governor John K. Tener, was filed for record in the office of Recorder Doll recently. The company was incorporated with a capital stock of $10,000.

A force of the Bell Telephone Company's employes are quartered in Freeland, and are engaged in constructing a double line between White Haven and Freeland. At present there is only one line in operation between these two towns.

The Chartiers Telephone Company, now operating the National Telephone Company, is preparing for an extensive expansion of business in Washington and adjacent points. It has been announced that work will shortly be started on the development of the system in East Washington, while an entrance to Canonsburg and Houston will be made in a short time. The exchanges at Claysville and West Alexander will be improved and rebuilt, while the system in Washington will be thoroughly overhauled.

The National, now the Chartiers Telephone Company, was granted an East Washington franchise some months ago. This action has been approved by the Pennsylvania Public Service Commission.

Gross earnings of the Keystone Telephone Company, Philadelphia, for February increased $938 and net decreased $1,478, due to an increase in operating expenses and taxes of $2,416.

The Petroleum Telephone Company has awarded to Pierce & Hinderliter the contract for completing the underground or conduit system of the telephone company in Oil City. The amount involved is about $10,000. The extensions will be on Main street, from the Oil creek bridge to Bridge street at the National Transit shops, on State street, Second and Orchard streets.

The Bell Telephone Company has just completed and put into service about four miles of new telephone line, extending from the Crawford County Home to the Dewey sawmill, near Blooming Valley.

The stockholders of the Berks and Lehigh Telephone and Telegraph Company of Kempton held their annual meeting recently and re-elected the following officers and directors: President, Dr. William J. Fetherolf; secretary, Abner B. Greenawalt; treasurer, Charles S. Oswald; directors, Richard Bond, A. B. Greenawalt and Albert Faust.

The sixth annual convention of the Western Pennsylvania Independent Telephone Association in the Fort Pitt Hotel, Pittsburgh, opened with President K. B. Schotte presiding and seventy-five delegates present. During the morning, papers were read and practical demonstrations of telephones and equipment were given. The following officers were elected: President, H. E. Webb, Pittsburgh; first vice-president, W. H. Wilson, Erie; second vice-president, J. H. Wright, Jamestown, N. Y.; secretary-treasurer, A. M. Critchton, Uniontown; executive committee, H. J. Patton, Huntingdon; E. D. Schade, Johnstown; K. B. Schotte, Kittaning. It was decided to meet in a joint session with the Eastern Association in Harrisburg in April.

The Banner Rural Telephone Company of Carrollton has reorganized by electing these officers: J. M. Huber, president; C. J. Miller, secretary; Alex Strittmatter, treasurer; H. J. Buck, manager; Edward Springer, C. J. Miller, H. J. Buck, J. M. Huber and C. W. Meisel, directors.

South Annville Rural Telephone Company, South Ann-

ville, Lebanon county, capital $10,000; incorporators, John M. Early, A. B. Gingrich, John H. Gingrich, Jacob L. Heagy, Bucher H. Gring and J. M. Bomberger.

The Bell Telephone Company of Littlestown is putting in a new trunk line to Silver Run.

The Bell Telephone Company of Pennsylvania has purchased the entire plant of the Mountainville Telephone Company, Limited, which company operated in Mountainville, Summit Lawn and Lanark.

Kittanning Telephone Company will install a new switchboard in their exchange at Tarentum.

TENNESSEE.

The Cumberland Telephone & Telegraph Company will begin the work of installing cables on all its lines in Selmer at an early date.

A local telephone company, with about fifty stockholders, has been organized at Estill Springs. It is to be known as the Estill Springs Telephone Company. R. C. Byrom is president; E. E. Lucas, vice-president; J. T. Lucas, secretary, and J. P. Tyner, treasurer

Millington will soon have a modern telephone system and will be in telephone communication with Memphis over the lines of the Bell system. The Millington Telephone Company, of which W. H. Bass is president and general manager, is installing a modern Western Electric switchboard and equipment to furnish service to about fifty subscribers in the corporate limit and to fifty farmers in the country surrounding Millington.

The Cumberland Telephone Company is installing a number of additional lines and remodeling and enlarging its switchboard at Dayton.

An ordinance requiring all telephone and telegraph wires to be placed in underground conduits has been passed by the city council of Jackson.

The Home Telephone Company has been chartered and organized at McMinnville with a capital stock of $3,000. The following officers of the new company have been elected; R. Seal, president; A. P. Warren, vice-president; L. G. Patrick, secretary-treasurer. Directors chosen are as follows: F. H. Badger, R. Seal, J. D. Elkins, John W. Womack, A. P. Warren and C. Gribble. It is the purpose of the new company to open an exchange in McMinnville at an early date.

Payment of the $70,000 Cumberland Telephone rebates to subscribers entitled to refund under the contract between the city and the company began February 23 in the council chamber at Memphis.

Rapid progress is being made by the Nashville, Chattanooga & St. Louis Railway in the plans to substitute the telephone for the telegraph on the Chattanooga division.

At the annual meeting of the Myers-to-Greenville Telephone Company held recently at Greenville the following officers were elected for the year of 1915: Newton C. Myers, president; W. H. Hartman, secretary and treasurer; J. R. Myers, C. S. Walker and F. M. Morrison, trustees.

A meeting of the Home Telephone Company at Lyner was held January 2 and the following officers were elected for the year: L. S. Robertson, president; Q. W. Smith, vice-president; Tom Martin, secretary; S. M. Julian, treasurer; board of directors, S. H. Wofford, Dr. Blackwell, W. D. Parks, Dennis Corbleigh and J. I. Neighbors.

The Cumberland Telephone and Telegraph Company of Memphis is now located in its new quarters on Court avenue.

TEXAS.

H. K. Brown is authority for the statement that the new toll line for the telephone company between Cleburne and Alvarado is practically ready for use. It is expected to extend this line to other points.

The South Texas Telephone Company moved into its new quarters at the corner of Beaumont avenue and Sixth street, Port Arthur. The building is modern in every respect and was built by the company for its exclusive use. The second floor of the building is given over entirely to the exchange and a switchboard installed that will accommodate 2,000 direct lines. The lower floor contains the battery room and commercial department.

The Gustine telephone exchange has been purchased by P. A. Pettit of this place, who has acquired the one-fourth interest held by W. O. Dingler.

President J. B. Earle of the Brazos Valley Telegraph & Telephone Company returned recently from Kansas City, where he completed the financial arrangements for taking over the properties of the Southwestern Company at Waco. He has signed a contract to purchase the southwestern exchange here and has deposited a substantial sum as earnest money.

B. W. Baker and his brother are completing the installation of a telephone system for Wellborn. There are seventy-nine phones in the system. They will begin installing a system at Millican.

At the meeting of the Chamber of Commerce September 8 a movement was started looking to the consolidation of the two telephone exchanges in Waxahachie. It was stated that conferences had been held with the officials of the two companies and with the users of telephones and it seemed to be the general opinion that all concerned were ready to work out a plan for consolidation.

Starr Telephone Company, Sam Fordyce; capital stock, $5,000. Incorporators: John Thaison, Pilar Hinoiosa, Albino Hinojosa.

The Floresville Rural Telephone Company has just installed a 100-drop switchboard at Poth, seven miles from Floresville. This is the first exchange for this place. All the equipment is first class and the exchange will be ready for business in a short time.

A charter has been granted the Crosby Telephone Company, Crosby; capital stock, $5,000; incorporators: F. J. Truxaw, W. M. Truxaw, John M. Cobb.

At a meeting of representatives of independent telephone companies, held in Dallas recently, plans were made for construction during the year of long distance extensions that will cost approximately $700,000. This announcement was made by J. C. Casler, vice-president of the Texas Independent Telephone Company.

The wires of the Independent Telephone Company of Austin are to be placed underground on Lavaca street, according to information received by Mayor Wooldridge from J. B. Earle of Waco, president of the Texas Independent Telephone Company.

The city commission adopted the telephone merger ordinance, becoming effective at once, authorizing the Independent Telephone Company of Ennis to take over all local property of the Southwestern Telephone Company not later than October 1, 1915. The Independent Telephone Company will expend $30,000 in general improvements, work to begin at once putting cables underground.

Block Telephone Company, Hereford, organized with E. Edmonds, president; Henry F. Miller, vice-president, and H. C. Dolcater, secretary-treasurer; proposes to build telephone system to connect with central in Canyon.

Farmers' Telephone Company, Round Top, capital stock, $1,040; incorporated by Fritz Knoche, E. A. Wells and others.

The telephone exchange at Corrigan was recently destroyed by fire.

A number of chief operators of the Southwestern Telegraph and Telephone Company conducted a two days' school of instruction in Ennis in the company's offices recently.

The Southwestern Telephone Company's Exchange at Granbury was recently destroyed by fire.

Dr. F. R. Bowles of Graford, Palo Pinto county, has sold his interest in the Whitt-Graford Telephone Company to the Keechi Telephone Company. The transfer includes the lines in Palo Pinto county and nearly all the lines in Jack county.

Extensive improvements are being made on the local telephone plant at Yorktown. An entirely new system will be installed.

The League City Telephone Company is making extensive improvements at Dickinson and throughout that vicinity. An exchange will be established in the new bank building, which will contain two stories in order to accommodate the telephone people.

The telephone exchange at Rogers has been acquired by J. M. Carroll of Temple, district manager for the Southwestern Telephone Company, who will operate the same as an independent exchange. The exchange is undergoing numerous improvements and has been placed in charge of Fred F. Khonke, of Temple, as manager.

A petition signed by 173 telephone subscribers in Itasca was recently presented to the city council there asking that the matter of uniting the two telephone systems in that city be underaken as soon as possible.

Ranger Telephone Company, Ranger, Eastland county; capital stock, $2,700. Incorporators: Dan Waggoner, J. M. Nicks, Houston Brashear.

Denver-Noble Telephone Company, Noble; capital, $1,000. Incorporators: Mrs. L. B. Essary, John Moten, G. G. Fishburn, Norman.

Nearly $100,000 will be spent by the Mountain States Telephone & Telegraph Company in Ogden this summer in placing

telephone wires in conduits in the principal streets outside the business section, according to information from the local office. In the business district most of the wires have been removed from the poles and placed in conduits.

A change in the districts of the Mountain States Telephone & Telegraph Company will result in the discontinuance of the district headquarters at Montpelier, reducing the division from six to five districts. Part of the district in southeastern Idaho will come under the supervision of the Pocatello district, and that part of the district in western Wyoming will be now managed by the Ogden office.

In a very short time the Mountain States Telephone & Telegraph Company will begin improvements on its system at Provo which will cost between $50,000 and $60,000. Poles will be removed from Center street, between Third East and Fifth West streets, and the wires run in underground conduits; in other parts of the city there will be a general overhauling.

VERMONT.

At the annual meeting of the Orange County Telephone Company held recently at Rutland the following officers were elected: C. L. Speare of Corinth, G. R. Andrews of Northfield, A. L. Patterson of Washington, Dr. E. E. Ellis of Brookfield and Harry Daniels of East Montpelier.

VIRGINIA.

Blackstone Telephone Company, Blackstone; changing name to Southside-Virginia Telephone Company, Inc.; increasing capital stock from $5,000 to $15,000.

The upper Rappahannock Telephone Line and holdings of the Tidewater Telephone Company from Montague, in Essex county, to Rappahannock, have been purchased by C. B. Conway of Haymount.

Amendment to the charter of the Reed Island Mutual Telephone Company, Sylvatus, increasing maximum stock from $5,000 to $10,000.

Oriskany Telephone Company, Oriskany. Capital stock, $600 to $5,000; build and operate a telephone line. E. R. Hudnall, president, Lignite; F. A. Tucker, vice-president; W. O. Crawford, secretary and treasurer, both of Oriskany.

WISCONSIN.

Authority to increase its rates from $1 to $1.25 for two-party line service and from $1.25 to $1.50 for single party was granted recently by the railroad commission to the Cascade Telephone Company of Cascade.

The Big Eau Claire Telephone Company, Stratford; capital, $1,000; incorporators, Michael Sinnolke, John F. Kroening, Walter R. Howe, Andrew Sinnolke and Louis Youkons.

The plans for the new building to be erected in Superior by the Wisconsin Telephone Company call for a three-story structure, the largest in the state outside of Milwaukee. While the plans have not yet been finally ratified by the officers of the telephone company, they will probably be finally endorsed within a short time and work ordered started. A site for the new building has been acquired on the west side of John avenue between Fourteenth and Fifteenth streets, adjoining the alley on the north side.

The Wisconsin Telephone Exchange at Prentice was destroyed by fire.

The state railroad commission has ordered the Omaha Railway Company to install a telephone of the Shell Lake Telephone Company in its depot at Shell Lake for the accommodation of shippers and passengers.

Physical connection between the toll lines of the La Crosse Telephone Company and those of the Wisconsin Telephone Company was effected September 9. Subscribers of either may call their central and request connection on long distance with the subscribers of the other.

At a sheriff's sale the property of the Five Mile Creek Telephone Company, at Eau Claire, consisting of eight miles of line, was sold for $47.

The first order for physical connection between two important telephone exchanges was made on June 3 by the state railroad commission, when the commission ordered the Wisconsin Telephone Company and the Rock County Telephone Company of Janesville to connect for toll, local and rural service.

Plans are being prepared by Architect H. J. Esser for a $7,000 addition to the Wisconsin Telephone Company building at Oshkosh, of solid brick construction, two stories and basement, 33 by 33 feet.

The Ashland Home Telephone Company, the North Wisconsin Toll Line Company and Bayfield County Telephone Company have been consolidated and will hereafter be operated under one management.

Articles of incorporation, with C. E. Macomber, J. A. Fitzgerald and Edward Evenson as signers, have been filed by the Tomahawk Rural Telephone Company, which intends to build a line to Harrison and later to Irma and Spirit Falls.

The annual meeting of the stockholders of the Marshfield Rural Telephone Company was held recently and the following officers elected: O. F. Veers, president; E. E. Butters, vice-president; John H. Brinkman, secretary and H. G. Hambright, treasurer.

The Comet Telephone company, Inc., of Tigerton, has been incorporated with a capital stock of $1,000 by Edward Bauer, Joseph R. Riendl and Charles F. Newmann.

Iron River Water, Light and Telephone company, Iron River; capital, $25,000; incorporators, T. F. Mackmiller, Alvana Mackmiller, Lillian H. Callahan.

Two crews of linemen of the Wisconsin Telephone company are at work stringing wire for a new telephone line that will make direct connection between Rhinelander and Merrill. It is expected that the work will be completed within a short time.

Sevastapol Farmers' Telephone company, Sturgeon Bay; capital, $3,000; incorporators, John G. Walker, L. F. Henschel, Joseph Petersilka.

Improvements of telephone service on the lines of the Elderon Telephone company of Elderon, Shawano county, were ordered by the railroad commission on its own motion.

Underground cables containing 600 pairs of wires, the largest ever used in Beloit, are being installed by the Wisconsin Telephone company as part of the comprehensive scheme of improvements and reconstruction by which poles will be removed from the downtown streets and moved from public to private property in other parts of the city. Thirteen miles of aerial cable and one mile of underground cable will be used before the work is completed. The total cost of all the improvements, which will be completed about May 1, is estimated by C. H. Klein, construction clerk, to be about $60,000.

John, Peter and John Theune, Jr., who recently purchased the Oostburg Telephone Company, Sheboygan, have filed articles of incorporation with a capital of $15,000.

Work is progressing rapidly on the addition to the Wisconsin Telephone Company's office on South Carroll street, Madison, and it is announced by the manager that the building will be completed by December 1.

Morley Telephone Company, Antigo; capital, $4,000; incorporators, Edward Cleary, William Reader, W. B. McArthur.

At a recent special meeting of the Elkhart Lake village board the Eastern Wisconsin Telephone Company was granted the privilege of underground service. Wires will be placed two feet underground for 1,200 feet in the center of the village and the telephone poles will be removed.

The Wisconsin Telephone Company of Delevan is making an inspection of all rural lines and installing new batteries in all telephones.

A number of extensions of telephone lines giving surrounding rural communities service are being made by the Border Cooperative Telephone Association, Spooner, including a line to Clementson and points east.

Five villages in Lincoln county, Merrill, have been connected by the Gleason Telephone Company, recently incorporated. The new line has fifty subscribers.

WYOMING.

The Mountain States Telephone & Telegraph Company at Casper have completed their cut-over from the old plant to the new cable system.

At the regular quarterly meeting of the board of directors of the Wisconsin Telephone Company held at Milwaukee expenditures of $215,000 for additions and improvements in Milwaukee and expenditures of $115,000 for additions and improvements in the state outside of Milwaukee were approved. The regular quarterly dividend of $2 per share was approved. The following directors were present: C. Jay French, Boston; Alonzo Burt and H. F. Hill, Chicago; Otto A. Falk, Julius O. Frank, Oliver C. Fuller, Edward A. Uhrig and H. O. Seymour, Milwaukee.

About $50,000 of the $330,000 to be expended by the Wisconsin Telephone Company for improvements during 1915 will go for the construction of a new exchange building in Superior.

The stockholders of the Chippewa County Telephone Company of Chippewa Falls held their annual meeting January 12 and the following officers were re-elected: President, Charles Liehe; vice-president, J. W. Thomas; secretary, F. B. Chase; treasurer, Earl S. Barker.